U.S. ARMY TANK-AUTOMOTIVE AND ARMAMENTS COMMAND

DETAILED PURCHASE DESCRIPTION FOR

THE OFF-ROAD FAMILY OF VEHICLES (11 TON TO 16.5 TON PAYLOADS) AND THE HEAVY EXPANDED MOBILITY TACTICAL TRUCK (HEMTT) EXTENDED SERVICE PROGRAM (ESP)

ATPD 2304

MARCH 18, 2001

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This specification was prepared 18 March 2001 by the US Army Tank-automotive and Armaments Command.

This specification is approved for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers a family of diesel engine driven, multi-wheel drive trucks and trailer designed to perform the following missions: Tanker, Tractor, Cargo (Light and Heavy), Wrecker, Load Handling System (LHS) (Light, Heavy and Common Bridge Transporter (CBT)) and LHS Trailer (LHST). This specification also covers the remanufacture of Heavy Expanded Mobility Tactical Trucks (HEMTT) through an Extended Service Program (ESP) to overhaul and enhance the performance of existing fielded variants. The vehicles will emerge from the ESP in "like-new" condition with a full new vehicle warranty. The goal of this acquisition is to maximize component commonality within a vehicle and between vehicle variants; minimizing cost of ownership (high reliability, low maintainability) by incorporating prognostic and diagnostic systems into the vehicles; and providing a cab that minimizes the potential of soldier injury that may result from frontal and roll-over type accidents through a combination of passive and active designs. The contractor is encouraged to use state-of-the-art components equal to or better than items stated herein as long as items meet requirements of this document.

1.1.1 Missions. The various mission categories are defined below:

MODEL	VEHICLE	MISSION THRESHOLD	MISSION OBJECTIVE
M977	Light Cargo		IA
M985	Heavy Cargo	IB1	
M985E1 GMT	Heavy Cargo Guided Missile Transporter (GMT)		IB2
M978	Tanker	II	
M984A1	Wrecker	III	
M983	Tractor	IV	
M1120 Bare	LHS-Light Bare (w/o LHS/winch)	VA0	
M1120	LHS-Light	VA1	
M1075 Bare	LHS-Heavy Bare (w/o LHS/MHC/winch/		

	Auxiliary Fuel Tank)	VB0
M1075	LHS-Heavy without Material Handling Crane	VB1
M1074	LHS-Heavy with Material Handling Crane	VB2
M1977	Common Bridge Transporter (CBT)	VC
M1076	LHS Trailer (LHST)	VI

The term Mission Variants or variants refers to all trucks and trailer. Mission Vehicle or vehicle describes the truck without trailer (e.g. Mission I Vehicle equates to the light and heavy cargo trucks). Mission Trailer or trailer refers to the LHST. Mission System describes the truck and trailer combination (e.g. Mission I System equates to the cargo truck with LHST). M1120 Bare Vehicles shall be used as platforms for the LHS-Light, CBT, and the Tactical Firefighting Truck (TFFT). Springs shall have a minimum rating of 32,000 lbs. M1075 Bare Vehicles shall be used as a platform for the launcher vehicle that supports the Heavy Dry Support Bridge. ESP vehicles are addressed in section 3.13 of this document. A matrix that describes how the vehicles were designated verses the descriptions provided above can be found in Appendix F.

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3 and 4 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements documents cited in sections 3 and 4 of this specification, whether or not they are listed.

2.2 Government documents.

2.2.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issue of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation (see 6.2).

COMMERCIAL ITEM DESCRIPTION (CID)

DEPARTMENT OF DEFENSE

A-A-50271	Plate, Identification
A-A-52418	Light, Warning, Vehicular: Rotating, Unit, 14 and 28 Volt DC
A-A-52432	Mirror Assembly, Rearview: Automotive Exterior Mounting

A-A-52474	Electrocoating Primer
A-A-52507	Chain Assembly and Cross Chain, Tire: For Military Vehicles
A-A-52513	Bracket Assembly, Liquid Container, Five Gallon
A-A-52525	Horns and Buzzers, Air- and Electrically-Actuated
A-A-52557	Fuel Oil, Diesel; For Posts, Camps and Stations
A-A-52624	Antifreeze, Multi-Engine Type
A-A-59326	Coupling Halves, Quick-Disconnect, Cam-Locking Type
A-A-59487	Padlock (Key Operated)

SPECIFICATIONS

DEPARTMENT OF DEFENSE

MIL-PRF-2104	Lubricating Oil, Internal Combustion Engine, Combat/Tactical Service
MIL-PRF-2105	Lubricating Oil, Gear, Multipurpose (Metric)
MIL-PRF-10924	Grease, Automotive And Artillery
MIL-PRF-20696	Cloth, Waterproof, Weather Resistant
MIL-S-40626	Sign Kit, Vehicle Class
MIL-PRF-46167	Lubricating Oil, Internal Combustion Engine, Arctic
MIL-PRF-52308	Filter-Coalescer Element, Fluid Pressure
MIL-C-53072	Chemical Agent Resistant Coating (CARC) System Application Procedures and Quality Control Inspection
MIL-P-53084	Primer, Cathodic Electrodeposition, Chemical Agent Resistant
MIL-PRF-62048	Air Cleaners, Automotive: Heavy Duty, Dry-Type (For Internal Combustion Engines) (Metric)
MIL-DTL-83133	Turbine Fuels, Aviation, Kerosene Types, NATO F-34 (JP-8), NATO F-35, and JP-8+100
MIL-V-81940	Valve, Sampling and Bleed, Hydraulic, Type II Systems

STANDARDS

FEDERAL

FED-STD-595	Colors Used in Government Procurement

DEPARTMENT OF DEFENSE

MIL-STD-129	Standard Practice For Military Marking
MIL-STD-209	Lifting and Tiedown Provisions
MIL-STD-209 E	Lifting and Tiedown Provisions
MIL-STD-209 G	Lifting and Tiedown Provisions
MIL-STD-461	Requirements for the Control of Electromagnetic Interference Characteristics of Subsystems and Equipment
MIL-STD-461 B	Requirements for the Control of Electromagnetic Interference Characteristics of Subsystems and Equipment
MIL-STD-461C	Requirements for the Control of Electromagnetic Interference Characteristics of Subsystems and Equipment
MIL-STD-462 , Interim Notice 4	Measurement of Electromagnetic Interference Characteristics
MIL-STD-462 , Interim Notice 5	Measurement of Electromagnetic Interference Characteristics
MIL-STD-810	Environmental Engineering Considerations and Laboratory Tests
MIL-STD-889	Dissimilar Metals
MIL-STD-1275	Characteristics of 28 Volt DC Electrical Systems in Military Vehicles
MIL-STD-1366	Transportability Criteria
MIL-STD-1472	Human Engineering
MIL-STD-1474	Noise Limits
MIL-STD-1553	Digital Time Division Command/Response Multiplex Data Bus

HANDBOOKS

DEPARTMENT OF DEFENSE

MIL-HDBK-454	General Guidelines for Electronic Equipment
MIL-HDBK-1791	Designing for Internal Aerial Delivery in Fixed Wing Aircraft

(Unless otherwise indicated, copies of the above specifications, standards, and handbooks are available from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia PA 19111-5094.)

2.2.2 Other Government documents, drawings, and publications. The following other Government documents, drawings, and publications form a part of this document to the extent

specified herein. Unless otherwise specified, the issues are those cited in the solicitation.

DRAWINGS

U. S. ARMY TANK-AUTOMOTIVE AND ARMAMENT COMMAND

7012810	Mount Assy., Machine Gun
8710630	Pintle Assembly, Heavy Duty
11630529	Rack, Storage, Small Arms
11630581	Bracket, Mounting, Catch Assembly
11630594	Support, Rifle Mounting
11677011	First Aid Kit
11682336	Cable & Plug Assy Intervehicle Power Cable
12258941	Connector, Receptacle, Electrical (54 Pin)
12322663	Towbar, Motor Vehicle
12360910	Driving Lamp, Blackout
12360870	Stop Lamp Assembly, Rear Blackout
13226E7078	Camouflage Painting Pattern for M977
13226E7080	Camouflage Painting Pattern for M978
13226E7082	Camouflage Painting Pattern for M983
13226E7088	Camouflage Painting Pattern for M985
13226E7288	Camouflage Painting Pattern for M984A1
13228E1690	Truck, Load Handling System, HEMTT

(Application for copies should be addressed to the U.S. Army Tank automotive and Armament Command, ATTN: AMSTA-LC-AH, Warren, MI 48397-5000)

US ARMY EDGEWOOD RESEARCH DEVELOPMENT AND ENGINEERING CENTER

D5-15-8779	Interface for M-8 Alarm

(Application for copies should be addressed to the: Technical Director, US Army Edgewood Research Development and Engineering Center, ATTN: SCBRD-RT/ASM, Aberdeen Proving Ground, MD 21010-5423)

US ARMY COMMUNICATIONS ELECTRONICS MATERIEL READINESS COMMAND

A3013814	SINGARS AN/VRC-90 Radio Set
A3013842	Antenna (AS-3684)
A3014039	Power Cable
A3019214	Mounting Base, Electrical Equipment For The

	MT6352/VRC-VEC
SCD189023	Antenna Support Assembly

(Application for copies should be addressed to the: US Army Communications and Electronics Materiel Readiness Command, Logistics Engineering Directorate, 12WD Bldg. 601 McAfee Center, Fort Monmouth, NJ 07703)

GUIDES, DESIGN

U.S. ARMY TANK-AUTOMOTIVE AND ARMAMENT COMMAND

CR-82-588-003	STE/ICE DCA Design Guide

(Application for copies should be made to U.S. Army Tank-automotive and Armaments Command, ATTN: AMSTA-TR-E/HTV, Warren, MI 48397-5000)

PURCHASE DESCRIPTION

U. S. ARMY TANK-AUTOMOTIVE AND ARMAMENT COMMAND

ATPD 2205	Test Equipment (Simplified) for Internal Combustion Engine – Reprogrammable (STE/ICE-R) Test Set
ATPD 2206R6	Batteries, Storage: Lead-Acid, “Maintenance Free” (Metric)

(Application for copies should be addressed to the U.S. Army Tank automotive and Armament Command, ATTN: AMSTA-LC-AH, Warren, MI 48397-5000)

TECHNICAL BULLETIN (TB)

U. S. ARMY TANK-AUTOMOTIVE AND ARMAMENT COMMAND

TB 43-0213	Corrosion, Prevention and Control Including Rustproofing Procedures for Tactical Vehicles and Trailers

(Application for copies should be addressed to the U.S. Army Tank automotive and

Armament Command, ATTN: AMSTA-LC-AH, Warren, MI 48397-5000)

REGULATIONS, ARMY

AR 70-38	Research, Development, Test and Evaluation of Materiel for Extreme Climatic Conditions

(Copies are available from the following website: http://www.usace.army.mil/inet/usace-docs/army-reg)

SOFTWARE

Reference Mobility Models for the HEMTT, PLS, PLST

(Application for copies should be addressed to the U.S. Army Tank automotive and Armament Command, ATTN: Jacob Brown, AMSTA-TR-E/HTV/406, Warren, MI 48397-5000)

GOVERNMENT AGENCIES

CALIFORNIA AIR RESOURCES BOARD (CARB)

Tank Pressure and Vacuum Requirements

(Application for copies should be addressed to the: California Air Resources Board, 2020 L Street, Sacramento, CA 95814)

DEPARTMENT OF TRANSPORTATION (DOT)

Federal Motor Vehicle Safety Standards (FMVSS)

178.346	Cargo Tank Motor Vehicle (DOT 406)
571.101	Controls and Displays
571.102	Transmission Shift Lever Sequence, Starter Interlock, and Transmission Braking Effect
571.104	Windshield Wiping and Washing Systems
571.108	Lamps, Reflective Devices, and Associated Equipment
571.119	New Pneumatic Tires for Vehicles other Than Passenger Cars
571.120	Tire Selection and Rims for Motor Vehicles

	Other Than Passenger Cars
571.121	Air Brake Systems
571.124	Accelerator Control Systems
571.208	Occupant Crash Protection
571.209	Seat Belt Assemblies
571.210	Seat Belt Assemblies Anchorage

Federal Motor Carrier Safety Regulations (FMCSR)

393.27	Wiring Specifications
393.28	Wiring to Be Protected
393.29	Grounds
393.30	Battery Installation
393.31	Overload Protection Devices
393.32	Detachable Electrical Connections
393.33	Wiring, Installation
393.40	Required Brake Systems
393.41	Parking Brake System
393.42	Brakes Required on All Wheels
393.43	Breakaway and Emergency Braking
393.45	Brake Tubing and Hose, Adequacy
393.46	Brake Tubing and Hose Connections
393.47	Brake Lining
393.48	Brakes to Be Operative
393.49	Single Valve to Operate All Brakes
393.50	Reservoirs Required
393.51	Warning Devices and Gauges
393.52	Brake Performance
393.55	Antilock Brake Systems
393.65	All Fuel Systems
393.67	Liquid Fuel Tanks
393.70	Coupling Devices and Towing Methods, Except for Driveaway-Towaway Operations
393.83	Exhaust Systems
393.95	Emergency Equipment on All Power Units

(Application for copies should be addressed to the Dept of Transportation, Federal Highway Administrations, Washington, DC 20591)

ENVIRONMENTAL PROTECTION AGENCY (EPA)

Control of Air Pollution from New Motor Vehicles and New Motor Vehicle Engines Compliance with Interstate Motor Carrier Noise Emission

Standards

(Application for copies should reference "Code of Federal Regulations 40 CAR and the Federal Register, and should be addressed to the Superintendent of Documents, US Government Printing Office, Washington, DC 20402)

HEADQUARTERS, DEPARTMENT OF THE ARMY

Common Table of Allowances (CTA)

50-900	Clothing and Individual Equipment

(Application for copies should be made to: Headquarters, Department of the Army, Washington, DC)

NATIONAL FIRE PROTECTION AGENCY (NFPA)

NFPA 407	Standard for Aircraft Fuel Servicing (National Fire Codes, Vol. 7)

(Application for copies should be addressed to the National Fire Protection Agency, One Batterymarch Park, PO Box 9101, Quincy, MA 02269-9101)

NORTH ATLANTIC TREATY ORGANIZATION (NATO)
STANDARDIZATION AGREEMENT (STANAG)

STANAG 2413	Demountable Load Carrying Platforms (DLCP/Flatracks)
STANAG 4007	Electrical Connectors Between Prime Movers, Trailers and Towed Artillery
STANAG 4074	Auxiliary Power Unit Connections for Starting Tactical Land Vehicles
QSTAG 244, Ed 3	Nuclear Survivability Requirements For Military Equipment

NORTH ATLANTIC TREATY ORGANIZATION (NATO) ALLIED VEHICLE TESTING PUBLICATION (AVTP)

AVTP 03-30WT	Steering and Maneuverability

(Applicable NATO documents are those that are current at NATO Headquarters (Military Agency for Standardization , 1110 Brussels). Copies are available from Global Engineering,

Inc., 15 Inverness Way East, Englewood, CO 80112).

OCCUPATIONAL SAFETY & HEALTH ADMINISTRATION (OSHA)

Title 29, CFR, Part 1910.1000 Air Contaminants

Crane Safety Standards

(Application for copies should be addressed to the American Conference of Government Industrial Hygienists (ACGIH), 1330 Kemper Meadow Drive, Cincinnati, OH 45240).

2.3 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DoD adopted are those listed in the issue of the DoDISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DoDISS are the issues of the documents cited in the solicitation (see 6.2).

AMERICAN PETROLEUM INSTITUTE (API)

API STD 1529	Aviation Fueling Hose (DOD Adopted)
API SPEC 1581	Specifications and Qualification Procedures for Aviation Jet Fuel Filter/Separators

(Application for copies should be made to the: American Petroleum Institute, 1220 L St NW, Washington, DC 200005

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

ASME B30.5	Mobile and Locomotive Cranes

(Applications for copies should be addressed to the: American Society of Mechanical Engineers, 345 East 47th Street, New York, NY 10017)

AMERICAN SOCIETY FOR TESTING & MATERIALS (ASTM).

D522	Mandrel Bend Test of Attached Organic Coatings (DOD Adopted)
D1171	Rubber Deterioration – Surface Ozone Cracking Outdoors or Chamber (Triangular Specimens) (DOD Adopted)

(Applications for copies should be addressed to the: American Society for Testing & Materials 100 Bar Harbor Drive West Conshohocken, PA 19428-2959)

EUROPEAN TIRE AND RIM TECHNICAL ORGANIZATION (ETRTO)

Standards Manual

(Application for copies should be addressed to the: European Tire and Rim Technical Organization, 32/2, avenue Brugmann, 8-1060 Brussels, Belgium or http://www.agency.be/etrto/).

GAMBLER-JOHNSON, LLC DRAWINGS

EPO103-6	Arrangement Drawing For PLS & HEMTT
EPO120-05	PGI HHC-133 Computer Mount Concept
EPO120-10	Arrangement, MTS Battery Box (FMTV, PLS, HEMTT, 900 Series)
EPO120-12	Arrangement, MTS Control Panel (FMTV, PLS, HEMTT & 900 Series)
EPO120-13	Antenna/Modem Mount Concept for the PLS/HEMTT, FMTV & HETS Vehicles

(Application for copies should be addressed to the: Gambler-Johnson LLC, 3001 Borham Ave, Stevens Point, WI 54481).

GENERAL MOTORS (GM)

GM 9540P	Accelerated Corrosion Test

(Application for copies should be addressed to Global Engineering, 7730 Carondelet Ave., Suite 407, St. Louis, MO 63105)

INTERNATIONAL ORGANIZATION OF STANDARDIZATION (ISO)

668	Series 1 Freight Containers – Classification, Dimensions and Ratings

(Application for copies should be addressed to International Organization of Standardization (ISO), Case Postale 56, Geneva, Switzerland CH-1211)

SOCIETY OF AUTOMOTIVE ENGINEERS, INC. (SAE)

AS8090	Mobility, Towed Aerospace Ground Equipment, General Requirements for (DOD Adopted)
J163	Low Tension Wiring and Cable Terminals and Splice Clips (DOD Adopted)
J198	Windshield Wiper Systems - Trucks, Buses, and Multipurpose Vehicles (DOD Adopted)
J318	Automotive Air Brake Line Couplers (Gladhands)
J336	Sound Level for Truck Cab Interior (DOD Adopted)
J343	Test and Test Procedures for SAE 100R Series Hydraulic Hose and Hose Assemblies
J366	Exterior Sound Level for Heavy Trucks and Buses (DOD Adopted)
J381	Windshield Defrosting Systems Test Procedures -Trucks, Buses, and Multipurpose Vehicles (DOD Adopted)
J382	Windshield Defrosting Systems Performance Requirements - Trucks, Buses, and Multipurpose Vehicles (DOD Adopted)
J516	Hydraulic Hose Fittings
J517	Hydraulic Hose
J534	Lubrication Fittings (DOD Adopted)
J560	Seven Conductor Electrical Connector for Truck-Trailer Jumper Cable (DOD Adopted)
J682	Rear Wheel Splash and Stone Throw Protection (DOD Adopted)
J683	Tire Chain Clearance-Trucks, Buses (Except Suburban, Intercity, and Transit Buses), and Combinations of Vehicle (DOD Adopted)
J697	Safety Chain of Full Trailers or Converter Dollies (DOD Adopted)
J701	Truck Tractor Semitrailer Interchange Coupling Dimensions (DOD Adopted)
J706	Rating of Winches (DOD Adopted)
J848	Fifth Wheel King Pin, Heavy Duty - Commercial Trailers and Semitrailers (DOD Adopted)
J849	Connection and Accessory Locations for Towing Multiple Trailers (DOD Adopted)
J994	Alarm - Backup - Electric Laboratory Performance Testing, Standard (DOD Adopted)
J1100	Motor Vehicle Dimensions (DOD Adopted)
J1292	Automobile, Truck, Truck-Tractor, Trailers, and Motor Coach Wiring (DOD Adopted)
J1436	(R) Requirements for Engine Cooling System Filling, Deaeration, and Drawdown Tests, Information Report
J1587	Joint SAE/TMC Electronic Data Interchange between Microcomputer Systems in Heavy Duty Vehicle Applications
J1708	Serial Data Communications between Microcomputer Systems in Heavy-Duty Vehicle Applications

J1850	Class B Data Communications Network Interface
J1939 Series:	
J1939-11	Physical Layer – 250K bits/s, Shielded Twisted Pair
J1939-13	Off-Board Diagnostic Connector
J1939-21	Data Link Layer
J1939-31	Network Layer
J1939-71	Vehicle Application Layer
J1939-73	Application Layer – Diagnostics
J1939-81	Recommended Practice for Serial Control and Communications Vehicle Network – Part 81 – Network Management
J1992	Wheels/Rims – Military Vehicles – Test Procedures and Performance Requirements

(Applications for copies should be addressed to the: Society of Automotive Engineers, Inc., 400 Commonwealth Drive, Warrendale, PA 15096)

TIRE AND RIM ASSOCIATION (TRA) INCORPORATED

TRA 1	Year Book

(Application for copies should be addressed to the: TRA Inc., 175 Montrose West Avenue, Suite 150, Copley, OH 44321)

TRW DRAWINGS

865988	Installation Drawing, HEMTT & PLS

(Application for copies should be addressed to the: TRW Space and Defense Sector, Space and Electronics Group, 1 Space Pk Blvd, Redondo Beach, CA 90278-1078).

2.4. Order of precedence. In the event of a conflict between the text of this specification and the references cited herein, the text of this specification shall take precedence.

3. REQUIREMENTS

3.1 Commerciality/commonality, components, parts, and accessories. All variants shall be the same to the maximum extent practical. All power train components shall be certified by the contractor as being compatible with and properly matched with all related or affected components assembled to meet the specifications stated herein. Maximum commonality of components shall be used throughout.

3.2 Manpower & Personnel Integration (MANPRINT)

3.2.1 Human engineering. System design and integration, to include operation of all equipment, shall accommodate operation and maintenance by a target audience of 5th percentile female through 95th percentile male (reference MIL-STD-1472 for guidance).

3.2.2 Safety. Unless otherwise specified herein, the Mission Variants shall comply with all FMCSR and FMVSS regulations applicable to a vehicle/system of this weight class at the time of original HEMTT and PLS contract (threshold) (objective – at the time of manufacture). The variants shall be free of sharp projections and/or edges that may cause operator/maintainer injury. Operators and maintenance personnel shall not be unknowingly exposed to rotating or moving parts, hot surfaces, electrically energized components, components containing high pressures or other inherently hazardous components or systems. Consideration shall be given to expected failure mode situations in addition to normal operations. Type II passenger restraints conforming to FMVSS 571.209 and FMVSS 571.210 shall be provided at all seating positions.

3.2.3 Manpower. Mission Variants shall be operational and maintainable by the following Military Operational Specialties while wearing the full range of army clothing, including arctic, and MOPP IV (see 6.3.9) clothing. The variants shall be operational and maintainable by the following Military Operational Specialties while wearing full combat gear (to include Load Bearing Equipment (LBE), personal body armor and protective mask), individual MOPP IV and arctic clothing. All operations for the variants shall be capable of being performed by a crew of two soldiers (threshold) (objective - one soldier; with the exception of Mission VA, VB and VC Vehicles when outfitted with the Container Handling Unit (CHU) which shall require no more than two soldiers to perform).

MOS for Operators:

12C Bridging Crewmember
13B Cannon Crew Member
55B Ammunition Specialist
62E Heavy Construction Equipment Operator
62F Crane Operator
62G Quarry Equipment Operator
62H Concrete and Asphalt Equipment Operator
62J General Construction Equipment Operator
77F Petroleum Heavy Vehicle Operator
77W Water Heavy Vehicle Operator
88M Motor Transport Operator

MOS for Maintainers:

44B Metal Workers
62B Construction Equipment Repairer

63G Fuel and Electrical Systems Repairer
63J Quartermaster and Chemical Equipment Repairer
63S Heavy Wheel Vehicle Mechanic
63W Wheel Vehicle Mechanic

3.2.4 Noise (objective). For each personnel position (operator, passenger, winch operator, crane remote operator, LHS remote operator) the steady state noise levels shall be below 85 dB(A) while in any operational mode when measured for maximum noise as specified in SAE J336.

3.2.4.1 Mission I, II, III, IV, VA and VC Vehicles (threshold). Vehicles shall also comply with both the exterior and interior noise limits outlined in MIL-STD-1474. The exterior sound level limits shall not be exceeded when measured according to the test procedure cited in SAE J366. The steady-state interior noise levels in personnel occupied areas shall not be exceeded when measured by MIL-STD-1474 with a steady-state noise Category of D. The personnel occupied areas shall be the following: Each operator and crew position, and occasionally occupied positions.

3.2.4.2 Mission VB Vehicles (threshold). The steady state noise levels in personnel occupied or occasionally occupied areas (each operator or crew position) shall be below 85 db(A) when measured for maximum noise as specified in SAE J336, except that the readings should be made at two-thirds the maximum rated engine speed with the transmission in the highest gear with the truck and trailer both at two-thirds rated payload. The noise levels within the cab shall not exceed 85 db(A) when the Load Handling System (LHS), and separately the Material Handling Crane are in full operation.

3.2.5 Hand holds and steps. All hand holds and steps shall be an integral and permanent part of the vehicle. This does not pertain to movable ladders if provided. If a movable ladder is provided, it shall be stored in a readily accessible location.

3.2.6 Emissions (objective). New production vehicles shall comply with Environmental Protection Agency (EPA) emission regulations/standards for new motor vehicles and new motor vehicle engines in effect at time of contract award.

3.2.6.1 Mission I, II, III, IV, VA and VC Vehicles (threshold). Mission I, II, III, IV, VA and VC new production vehicles shall comply with 1996 non-road Environmental Protection Agency (EPA) emission regulations/standards for new motor vehicles and new motor vehicle engines.

3.2.6.2 Mission VB Vehicles (threshold). Mission VB new production vehicles shall comply with 1990 on-road Environmental Protection Agency (EPA) emission regulations/standards for new motor vehicles and new motor vehicle engines.

3.3 Dimensions. Dimensions shall be as follows, when the vehicle is at GVW, unless otherwise specified.

3.3.1 Width. The vehicle shall not exceed 96 inches (2.4 M) in width when measured IAW SAE J1100 excluding grab handles on all variants and tire bulges on Mission VB Vehicles.

3.3.2 Height (with the exception of kits). Overall height of Mission VA, VB and VC Vehicles and LHST at VCW, shall not exceed 142 inches (3.6 M) (threshold). Mission VA, VB and VC Vehicles and LHST shall be capable of negotiating a 157.5 inch (4 M) underpass while transporting an empty ISO 668, Type 1C freight container mounted on a flatrack (FR) (objective). Overall height of Mission IB2 Vehicles VCW, shall not exceed 148 inches (threshold).

3.3.3 Length. The overall length of the Mission System (vehicle and primary trailer – see Table IV) shall not exceed 60 ft during highway and secondary road operation (without extended drawbar kit). Mission System may exceed 60 ft as required to preclude interference between the truck and trailer such as during cross-country operation. The Swing Radius (SR) and Clearance (CT) minimum dimensions shall comply with SAE J701.

3.4 Transportability. The variants, and all FR models (see 3.10.1.1) as applicable, shall be transportable by highway, rail, marine, and air modes worldwide. The transportability criteria shall be as specified in MIL-STD-209 (objective) and MIL-STD-1366 (Mission I, II, III and IV Vehicle threshold - MIL-STD-209E; Mission VA and VC Vehicles (without FRs or Bridge Adapter Pallets (BAP)) threshold - MIL-STD-209E; Mission VB Vehicle threshold – MIL-STD-209G). Unless otherwise specified, preparation for transport by any mode shall not exceed 15 minutes using only two soldiers and onboard equipment (basic issue item (BII) tools). It shall be capable of negotiating a 15-degree ramp (air and marine transport) at GVW/GCVW (threshold) without the requirement for approach shoring (objective). All removed parts and tools shall be self-storing and secured for travel on the vehicle and shall not interfere with other loads or the normal actions required for movement in and around transport aircraft.

3.4.1 Lifting and tiedown provisions. Lifting and tiedown provisions, including the connecting structural members on the vehicle and PLST, separately at GVW, shall be IAW MIL-STD-209 (objective), Type I vehicles, lifting, equipment tiedown and/or multipurpose provisions (Mission I, II, III, IV, VA and VC Vehicle threshold - MIL-STD-209E; Mission VB Vehicle threshold – MIL-STD-209G, type II vehicles, class 1, 2, and/or 3 provisions) (reference MIL-HDBK-1791 for guidance). The lifting and equipment tiedown provisions on all vehicles shall be hard-mounted (objective). The locations of the equipment tiedowns shall permit the vehicle to be secured to the transport medium in such a manner as to prevent shifting or movement in any direction. Designs using single purpose provisions (maximum - four used for lifting only and four used for tiedown only to meet MIL-STD-209G requirements and the latest revision of MIL-STD-209) will be permitted for Mission VB Vehicles (objective – Mission I, II, III, IV, VA and VC Vehicles). ESP shall meet the requirements of the original chassis or the current production mission variants.

3.4.2 Cargo aircraft. All equipment removed in order to meet Air Transportability requirements shall be stowed on the vehicle. Reference MIL-HDBK-1791 for guidance.

a. Mission I, II, III, IV, VA and VC Vehicles at VCW (less machine gun (MG) ring mount kit) shall be capable of being transported without restriction on the C-17, C-130, C-141, and C-5A aircraft.

b. Mission VB Vehicles at VCW (less machine gun (MG) ring mount kit) shall be capable of being transported without restriction on the C-141, C-5A, and C-17 aircraft.

c. Mission VI Trailer (LHST) shall be capable of having one trailer stacked on top of another, such that two LHST shall be transportable in C-5A and C-17 aircraft. The LHST shall be transportable by the C-130 and C-141 as a single unit.

3.4.2.1 Mission II and III Vehicle preparation. 120 minutes total is permitted for two individuals to prepare the Mission III Vehicle for air transportation. Equipment removed from Mission III Vehicle and the spare tire from the Mission II Vehicle may be stored directly in the aircraft(s).

3.4.3 Rail. The vehicle at VCW shall meet the unrestricted rail transport criteria for North America when loaded on a 50 inch high flatcar and NATO rail transport criteria when loaded on a 51.4 inch flatcar.

a. The vehicle at GVW (except Mission III and IV Vehicles at vehicle curb weight) shall withstand, without damage or degradation in performance, the rail impact test in accordance with MIL-STD-810, test 516.5, procedure VII. Crossed tiedown cables or chains shall not be used to pass the rail impact test.

b. Mission VI Trailer (LHST) shall be capable of having one trailer stacked on top of another, such that two LHST shall be transportable on a 50 inch (1.27 M) high railcar with a maximum of 30 minutes preparation time.

3.4.4 Marine.

a. Mission I, II, III, IV, VA and VC Vehicles at GVW shall be capable of being transported on the Logistics Over the Shore (LOTS) craft. Mission I, II, III, IV, VA and VC Vehicles at GCW shall be capable of being transported on larger vessels/ships.

b. Mission VB Vehicles at GVW shall be capable of being transported on the LARC-LX. Mission VB Vehicles at GCW shall be capable of being transported on RO/RO ships (objective) and larger vessels/ships.

c. Mission VI Trailer shall be capable of having one trailer stacked on top of another, such that two LHST shall be transportable on the LARC-LX and larger vessels.

3.4.5 Highway.

a. Mission I, II, III, IV, VA and VC Vehicles shall be transportable under its own power or by semitrailer for highway movement in CONUS and OCONUS (using permits as required).

b. Mission VB2 Vehicle shall be transportable by commercial and military trucks and have a CONUS and OCONUS (with special permit for weight in OCONUS) highway legal minimum usable payload of 5 tons except the states listed in Table I below. Mission VB1 System shall have a CONUS and OCONUS (with special permit for weight in OCONUS) highway legal usable payload of at least 7 tons except in the state listed in Table II below. The U.S. highway legal width limits are those that pertain to interstate highways and federally designated connector routes.

TABLE I – MISSION VB2 PAYLOAD PROHIBITED STATES

Arizona	New Mexico
District of Columbia	New York
Illinois	Ohio
Missouri	Washington

TABLE II – MISSION VB1 PAYLOAD PROHIBITED STATES

Arizona

3.4.5.1 Hazardous material transport.

a. Vehicles shall meet all CONUS, OCONUS and NATO highway safety requirements for the transport of POL, conventional ammunition, and missiles where applicable.

b. Mission VI Trailer shall meet all of the CONUS and NATO highway safety requirements for the transportation of hazardous materials.

3.5 Fuels and lubricants. The variants shall be operable with applicable standard military fuels (JP-8 and diesel), lubricants and fluids as required by the climatic operating requirements without component degradation and adverse affect on the vehicle performance or warranty provisions. All initial fills shall be of standard military fuels, lubricants and fluids including those called out in A-A-52557, MIL-PRF-46167, MIL-PRF-2105, MIL-PRF-2104, MIL-PRF-10924, MIL-DTL-83133, and A-A-52624. If liquid cooled, the engine shall be serviced with a solution of ethylene glycol conforming to A-A-52624 and water in equal parts by volume.

3.5.1 Vehicle lubrication. Maintenance free draglinks and tie rods (except tie rods on number 1 axle on Mission I, II, III, IV, VA and VC Vehicles) shall be utilized. Mission VB Vehicles shall utilize maintenance-free propshafts (objective). The manufacturer shall make maximum use of single point/central lubrication system (objective) to lubricate multiple components from one location where commercially available. Where possible use of

permanently lubricated components such as universal joints and unitized wheel hubs shall be utilized. Grease fittings shall only be used when maintenance free components are not available (objective). Grease lubrication fittings shall conform to SAE J534. Pressure relief shall be provided in all cases when lubricating pressure may damage grease seals or other parts.

3.6 Materials, Painting, marking and corrosion.

3.6.1 Material. Unless specified otherwise in the contract, all materials provided as part of the Production Variants shall be new and unused. Recycled material is acceptable when processed to make new material. The recycled material shall consist of at least 50% virgin material.

3.6.2 Reserved.

3.6.3 Painting. All variants shall be painted with CARC topcoats (Green 383 – chip #34094, Black – chip #37030, Brown 383 – chip #30051, Tan 686A – chip #33446 in accordance with FED-STD-595). All painting shall be performed IAW MIL-C-53072 using only those cleaning, pretreatment, primer, and topcoat specifications contained therein except that A-A-52474 can be substituted for MIL-P-53084. It is the responsibility of the manufacture to select the proper pre-treatment, primer and topcoat to achieve short term and long term adhesion and corrosion resistance. Regardless of the number of layers of topcoat, the total dry film thickness (from substrate to outer layer) shall not exceed 13 mils. Adhesion and corrosion resistance testing (see 3.6.6) shall be the method by which the paint and pretreatment systems are qualified. Parts not normally painted in commercial practice, such as tires, hoses and hydraulic cylinders, shall not be painted but shall be protected against corrosion (see paragraph 6.4).

The vehicle exterior treat, prime, and paint requirements were developed to provide a surface of low reflectivity, no effort shall be made to counter that effect. All metal and plastic surfaces not normally painted shall be prepared, treated and finished to provide a matte finish. There shall be no exposed chrome, reflective surfaces or ornamental trim.

3.6.3.1 Camouflage pattern. When specified, variants shall be painted in accordance with the following Government furnished camouflage pattern. Variants not requiring camouflage pattern shall be painted Green 383 – chip #34094 or Tan 686A – chip #33446 as directed by the Government.

M977	13226E7078
M985	13226E7088
M985E1 GMT	
M978	13226E7080
M984A1	13226E7288
M983	13226E7082
M1120 Bare	N/A
M1120	13228E1690

M1075 Bare N/A
M1075
M1074
M1977
M1076

3.6.4 Identification and marking. Vehicle registration number shall be applied to the inside of the driver's door in a readily visible location. The lettering height shall be as large as possible up to a maximum of four inches. The national symbol (five pointed star) shall be applied to the front and rear of the vehicle, in a readily visible location on the longitudinal centerline of the truck. The national symbol shall be inscribed within a three-inch diameter circle. The color for the registration number and national symbol shall be Black chip number 37030 in accordance with FED-STD-595 on backgrounds of green or brown. Camouflage 383 chip number 34094 shall be used on black backgrounds. Marking and identification in accordance with MIL-STD-209 shall be provided.

a. Mission I Vehicle shall have two stabilizing system signs, one inch lettering, shall be placed at each side next to the control station stating STABILIZERS MUST BE FULLY EXTENDED AND IN PLACE BEFORE LIFT IS MADE.

b. The Mission II Vehicle shall also have on each side and the rear of the vehicle:

1. "FLAMMABLE" in 6-inch block letters
2. "NO SMOKING WITHIN 50 FEET" in 3-inch block letters

c. Mission III Vehicle shall have two stabilizing system signs, one inch lettering, shall be placed at each side next to the control station stating STABILIZERS MUST BE FULLY EXTENDED AND IN PLACE FOR ALL LIFT OPERATIONS WHICH ARE NOT DIRECTLY BEHIND THE TRUCK.

d. Mission VB2 Vehicle shall have one sign, one inch lettering, shall be placed next to the control station stating "CAUTION STABILIZERS MUST BE FULLY EXTENDED AND IN PLACE BEFORE LIFT CAN BY MADE"

3.6.5 Data plates. Instruction, caution, identification, operating and data plates shall be provided in accordance with A-A-50271 and installed by rivets, screws or bolts at fixed control stations and appropriate operating instructions shall also be placed on the remote control unit (as applicable). Military model number, nomenclature, National Stock Number (NSN), contract number, date of manufacturer, manufacturers serial number and U.S. Army Registration number shall be imbedded or embossed on an additional metal identification plate. The identification plate shall be installed in the crew area in a readily visible location. The variants shall be equipped with data plates containing instructions or diagrams including procedures to be followed in assembling, operating or servicing the variants. The contractor shall apply the vehicle weight classification numbers to each vehicle utilizing a vehicle classification number kit (reference MIL-S-40626 for guidance), except that the colors used shall be black characters on a

background field of #383 camouflage green chip # 34094. The kit shall be located in the front of the vehicle. "CARC" shall be painted in block letters no larger than 1 inch (25.4 mm) in a conspicuous place near the truck, trailer, and FR dataplates. Shipping dataplate and identification, in accordance with (IAW) MIL-STD-209 shall be provided.

3.6.6 Corrosion.

3.6.6.1 Corrosion control for all Mission Variants (threshold). The vehicle shall operate for a 10 year minimum service life, which can include varying or extended periods in corrosive environments involving one or more of the following: high humidity, salt spray, road de-icing agents, gravel impingement, atmospheric contamination and temperature extremes. Only normal washing, scheduled maintenance and repair of accidentally damaged areas (not a result of deficiency in design, material, manufacturing or normal wear), shall be necessary to keep the corrosion prevention in effect. Dissimilar metals in accordance with MIL-STD-889 shall be electrically insulated from one another to prevent galvanic corrosion.

3.6.6.2 Corrosion control for all Mission Variants (objective). Vehicles shall be protected from rust and corrosion such that there shall not be any corrosion beyond stage 2 as defined by TB 43-0213 for a period of 20 years service life when operated through its mission profile, to include extensive periods in highly corrosive salty environments and exposure to high humidity, road de-icing agents, gravel impingement, and atmospheric contamination. Stage 2 corrosion shall be limited to 5% of major subassemblies (e.g. cab, doors, frame, winch station, etc.). Stage 1 corrosion during this period is limited to 20% of the surface area. Where Government/Military representatives determine components repair due to corrosion is required, the component shall be considered a failed part, necessitating no-cost to the government replacement of that component. The accelerated corrosion test GM 9540P, method B, 160 cycles and ASTM D522 Mandrel Bend Test shall be used to evaluate the relative performance of a proposed design.

3.6.7 Material Resistance (objective). All materials, except brake hoses shall be resistant to fungus inert (reference MIL-HDBK-454, Requirement 4 for guidance) and all rubber products ozone resistant in accordance with ASTM-D1171, using Ozone-Chamber exposure method B as applicable, but meeting the standard of method B (7.4).

3.6.8 Non-skid surface. When surfaces of the variants are to be used as walkways, working areas (including cargo truck beds) and steps, non skid protection (excluding adhesive tape) shall be provided.

3.7 Environmental conditions. The variants shall be capable of full vehicle and crew operation, transport, and stowage in climactic hot, basic, and cold areas as defined in AR 70-38. This shall include stowage on Preposition (PREPO) Afloat vessels up to one year with 6 month maintenance interval (threshold) (30 months without loss of mission essential functions with routine unit-level (i.e., -10 level) maintenance performed every six months - objective). For storage purposes, minimum processing and deprocessing is permitted. Special kits to meet cold area climactic conditions are acceptable. Preheating, if required, shall not require an external electrical power source.

3.8 Interoperability, standardization and compatibility with other NATO countries. Interoperability with similarly equipped NATO country equipment is mandatory. Trailer interface shall be in accordance with NATO STANAG 4007 12 pin connector requirements. Mission V Vehicles and LHST shall interface with flatracks which conform to NATO STANAG 2413 (see 3.10.9.1.1).

3.9 Component protection. The design shall prevent accidental damage from standing or stepping over components to gain access to other areas of the Mission System.

TABLE III – PERFORMANCE REQUIREMENTS

TEST	MISSION	GVW/GCW	THRESHOLD	OBJECTIVE
GRADE OPERATION	I, II, III, IV, VA, VB, VC	GCW	30% GRADE	40% GRADE
	I, II, III, IVA, VA, VB, VC	GVW	60% GRADE	60% GRADE @ 5 MPH
SPEED	I, II, III, IV, VA, VC	GCW	3% GRADE @ 25 MPH	
	I, II, III, IV, VA, VC	GVW	3% GRADE @ 40 MPH	
	I, II, III, IV, VA, VC	GCW@ 100,000 lbs.	2% GRADE @ 40 MPH	2% GRADE @ 60 MPH
	VB	GCW	2% GRADE @ 35 MPH	2% GRADE @ 40 MPH
	I, II, III, IV, VA, VB, VC	GVW	2% GRADE @ 50 MPH	
	I, II, III, IV, VA, VC	GCW	40,000 LB Towed Load @ 55 MPH on Level Surface	
	VB	GCW	55 MPH on Level Surface	60 MPH on Level Surface
	VB	GVW	55 MPH on Level Surface	60 MPH on Level Surface
SIDE SLOPE	I, II, III, IV, VA, VB, VC	GCW	30% GRADE	
	I, II, III, IV, VA, VB, VC	GVW	30% GRADE	40% GRADE
PARKING BRAKES	I, II, III, IV, VA, VC	GVW	20% GRADE	40%GRADE
	I, II, III, IV, VA, VC	GCW	----------	30% GRADE
	VB	GVW	30% GRADE	40% GRADE
	VB	GCW	30% GRADE	40%GRADE

TABLE IV – Minimum Payloads for Vehicles and Trailer

MODEL	MISSION	VEHICLE	PRIMARY TRAILER	PAYLOAD Threshold - Objective	TRAILER PAYLOAD Threshold – Objective
M977	IA	Light Cargo	M989A1	22,000 lbs.- N/A	22,000 lbs.- N/A
M985	IB1	Heavy Cargo	M989A1	22,000 lbs.- N/A	22,000 lbs.-N/A
M985E1	IB2	Heavy Cargo GMT	M989A1	22,000 lbs.- N/A	22,000 lbs.- N/A
M978	II	Tanker	M105 w/POD	2500 gal.(1)- N/A	22,000 lbs.-N/A
M984A1	III	Wrecker	M1073	N/A- N/A	60,000 lbs.(2)- N/A 100,000 lbs.(3)-N/A
M983	IV	Tractor	M860A1	N/A-N/A	16,930 lbs.-80,000 lbs.(4)
M1120 Bare	VA0	LHS-Light Bare (w/o LHS/winch)	M1076	N/A(5)	26,000 lbs.(6)-22,000 lbs.(7)
M1120	VA1	LHS-Light	M1076	26,000 lbs.(6)(8)-22,000 lbs.(7)	26,000 lbs.(6)(8)-22,000 lbs.(7)
M1075 Bare	VB0	LHS-Heavy Bare (w/o LHS/MHC/winch)		N/A(5)	26,000 lbs.(6)-22,000 lbs.(7)
M1075	VB1	LHS-Heavy (w/o MHC)	M1076	36,250 lbs.(6)(9)-33,000 lbs.(7)	36,250 lbs.(6)(9)-33,000 lbs.(7)
M1074	VB2	LHS-Heavy (w/MHC)	M1076	36,250 lbs.(6)(9)-33,000 lbs.(7)	36,250 lbs.(6)(9)-33,000 lbs.(7)
M1977	VC	Common Bridge Transporter (CBT)	M1076	24,000 lbs.(6)(10)-N/A	24,000 lbs.(6)(10)-N/A
M1076	VI	LHSTrailer (LHST)	N/A	36,250 lbs.(6)-33,000 lbs.(7)	N/A-N/A

(1) Payload shall be 2500 gallons of JP-8.
(2) Payload applies to the weight of the recovered vehicles for lift and tow requirement.
(3) Payload applies to the weight of the recovered vehicle for flat tow requirement.
(4) Payload applies to the weight loaded onto the M870 semitrailer (i.e. M870)
(5) Payloads apply to the variants only when outfitted with applicable LHS or CBT provisions.
(6) Payload shall include the weight of the flatrack (approx. 4,000 lbs.) and the weight of the Container Handling Unit (CHU) (as applicable).
(7) Payload shall not include the weight of any component such as flatrack (FR), Container Roll On/Off Platform (CROP) or ISO containers/shelters, Container Handling Units (CHU), tiedown devices, sideboards or tarpaulins.
(8) Combined payload center of gravity shall be located no greater than 44 inches above the flatrack corner casting bottom and 110 inches rearward of the bail bar.
(9) The ISO container/FR/shelter shall be loaded with a uniformly distributed load and a payload center of gravity 24 inches (610 mm) above the container floor.
(10) The payload longitudinal center of gravity must not be more than 5 inches forward or behind flatrack center.

3.10 Performance. All performance requirements shall be met with the vehicle at Gross Vehicle Weight (GVW), unless otherwise specified. If Gross Combination Weight (GCW) is specified, the LHST shall be the towed trailer for all Mission Vehicles, unless otherwise specified. Minimum payload requirements are defined in Table IV. All performance requirements shall be met while operating on DF-2 (threshold), JP-8 (MIL-DTL-83133) (objective). The system shall be capable of all slope operations as specified herein with 10% of the fuel tanks useable volume remaining and without leakage when at maximum rated capacity. Grade surface shall be smooth, dry, hard surface pavement. Brakes shall conform to paragraph 3.11.10.

3.10.1 Payload. Mission Vehicles shall be capable of transporting the payloads and towed payloads using the Mission Trailer (as applicable) as outlined in Table IV.

3.10.1.1 Flatracks (FR) and containers. LHS Vehicles shall interface with the following FR and containers: M1077, M1077A1, M1, M3, M3A1, Engineering Mission Modules (EMMs) (dump body modules and fuel tank and pump modules), Fuel Racks, ISO 668, Type 1CX (4 ft. 3 in. height) to ISO 668, Type 1CC freight containers, Boat Cradles, Brigde Adapter Pallets (CBT Vehicle only) and FR built to NATO STANAG 2413. Containers shall require the use of a CHU installed on the vehicle (threshold) (objective – no CHU required). LHS vehicles shall interface with any properly configured load that can be loaded /unloaded on/from the vehicle.

3.10.2 Towing a like truck. The vehicle at GVW shall be capable of being towed by any other like vehicle at GVW, (with no preparation - threshold for Mission VB Vehicles, objective for Mission I, II, III, IV, VA and VC Vehicles), with the exception of the hook-up of the towbar (dwg 12322663) and the towbar adapter (NSN 2540-01-408-1538), for a distance of at least 100 miles (160 km) at a minimum speed of 35 mph (56 km/hr) on a paved level road. All vehicles at Vehicle Curb Weight (VCW) (see 6.3.24) shall be capable of being lifted and towed from the front and rear by the M984A1 and the production Mission III Vehicle.

3.10.3 Towed load capability. All Mission Vehicles at VCW shall be capable of pintle towing the following trailers at GVW: M105, M1073, M149, M332, M989. Mission VB Vehicles at VCW shall be capable of pintle towing the additional trailers at GVW: M1076 and LHST at GVW. Mission VA Vehicles shall be capable of pintle towing the M1076 at Mission VA payload (see Table IV).

3.10.4 Grade operation (longitudinal slope). The variants shall be capable of climbing and descending at the grades and payloads specified by Table III with intermediate starts and stops, and without loss of fluids or malfunction. Engine shall be capable of starting/stopping/and restarting while at GCW on specified grade. At GVW, engine shall be capable of running while the truck is stopped on specified grade.

3.10.5 Side slope operation. The variants shall be capable of operating on and traversing side slopes at the grades and payloads specified in Table III. As a result of the operation, no evidence of faulty lubrication, leakage, or other malfunction/degradation or loss of stability shall be found.

a. Side slope operation of the Mission VA1, VB1, VB2 and VC vehicles shall also be capable of being performed with an ISO 668, Type 1C freight container secured with a flatrack (threshold) (objective - without a FR) with the Central Tire Inflation System (CTIS) set in the highway mode, as applicable.

3.10.6 Speed. The variants shall be capable of obtaining and maintaining the speeds specified by Table III at the specified grades and payloads.

3.10.7 Governed speed. Maximum geared speed at engine full load governed speed shall not exceed 65 mph for all vehicles. Engine governed speed shall not exceed the maximum RPM rating specified by the engine manufacturer.

3.10.8 Range. Mission I, II, III, IV, VA and VC Vehicles at GCW shall be capable of being operated at least 300 miles (563.6 km) (objective 400 miles) while operating over a representative portion of the mission profile (Table VII) without refueling. Mission VB Vehicles at GCW shall be capable of being operated at least 225 miles (objective 300 miles) while operating over a representative portion of the mission profile (Table VII) without refueling. The average speeds over each terrain type shall not be less than 50% of the maximum safe speed.

3.10.9 Vertical step. Variants shall have sufficient clearances to negotiate a 24-inch (610 mm) minimum vertical step while moving forward.

3.10.10 Tracking. The Mission System shall conform to the tracking requirements of FMCSR 393.70.

3.10.10.1 Backing. Mission Vehicles shall be capable of interfacing with the backing assist device of the LHST (objective) (see 3.12.6.2).

3.10.11 Steerable/lockable rear axle (objective). If a steerable rear axle is used on the vehicles, a locked neutral steer position shall be provided at speeds over 20 MPH. Transitions to and from the neutral steer position shall not adversely affects the handling of the vehicle. In the event of a rear steer system failure, the rear axles shall assume a neutral, locked position.

3.10.12 Lane changing (objective). The vehicle at GCW shall be capable of making lane changes at speeds up to 35 mph (55 km/hr). The vehicle shall move from one lane to another, between 2 pylons located a distance of 118 feet (36 M) apart. The vehicle shall then return (continuing at same speed) to the original lane prior to reaching a third pylon located in a straight line from and the same distance apart as the original pylons, without any tire leaving the ground.

3.10.13 Turning requirement.

a. For Mission I, II, III, VA and VC Vehicles, in no case shall the turning diameter (curb-to-curb) exceed 110 feet.

b. Mission IV Vehicle clearance circle shall not exceed ~~95~~ 100 feet. Mission IV Vehicle with M860 semitrailer at GCVW shall be able to negotiate a right angle turn posed by an intersection of two roads 30 feet wide (wall to wall) (threshold), 24 feet wide (wall to wall) (objective), without stopping.

c. Mission VB Systems at GCW shall be able to negotiate a right angle turn posed by an intersection of two roads 30 feet wide (curb to curb) (threshold), 25 feet wide (curb to curb) (objective), without stopping.

3.10.14 Lateral stability.

a. For Mission III and IV Vehicles, the roll stiffness shall be such that a .5G lateral acceleration shall not produce a body roll angle of more than 5 degrees or a total roll angle of more than 7.5 degrees with the tires at the off-road inflation pressure and at full gross vehicle weight.

b. Mission I, II, VA and VC Vehicles shall be allowed greater roll freedom over the requirements for Mission III and IV Vehicles, compatible with overall vehicle stability.

c. For Mission VB Vehicles (objective), the roll stability as determined from a steady-state circular turn test on a 170 to 200 foot radius course with a level, paved surface shall meet or exceed a wheel-liftoff threshold of 0.34 g's with a total body roll not to exceed 8.0 degrees. The steering stability as determined from a steady-state circular turn test on a 170 to 200 foot radius course with a level, paved surface shall meet or exceed an instantaneous characteristic understeer gradient (steer angle divided by the lateral acceleration) of -5.0.

d. The LHST transporting an ISO 668, Type 1C freight container secured to a FR at GVW defined by Table IV, shall be able to sustain up to 0.40g lateral acceleration without any of the tires of the LHST leaving the ground while being towed by the vehicle on a paved level road.

3.10.15 Fording.

a) The Mission System (vehicle and trailer) shall, without any preparation, be driven into a water crossing 48 inches in depth with hard bottom for not less than 5 minutes, at speeds up to 5 mph (8 km/h) without preparation or additional maintenance prior to further operation. The Mission System lubricants shall be checked for contamination. Contaminants beyond 0.25% by volume are not allowed for Mission VB Vehicles. Contaminants beyond 2.0% by volume ~~is~~ are not allowed for Mission I, II, II, IV, VA and VC Vehicles.

b) The Mission System shall, without preparation, be driven into a water crossing 48 inches in depth with hard bottom for five minutes and then the engine shall be turned off. After 5 minutes, the Mission System shall be restarted and the vehicle backed out of the water. The Mission System lubricants shall be checked for contamination. Contaminants beyond 0.25% by volume are not allowed for Mission VB Vehicles. Contaminants beyond 2.0% by volume are not allowed for Mission I, II, II, IV, VA and VC Vehicles.

3.10.16 Approach & departure angles. Protrusion of the tow eyes into the angle of approach plane is permitted.

a. The angle of approach shall not be less than 41 degrees and the angle of departure not less then 39 degrees in the area of the pintle hook not including the safety chain loop for Mission I, II, III, IV, VA and VC. Angles shall be defined in accordance with SAE J1100.

b. The approach and departure angles of Mission VB Vehicles shall not be less than 42 degrees. Angles shall be defined in accordance with SAE J1100.

3.10.17 Braking. Unless otherwise specified in this purchase description, the performance of the brake system shall comply with FMVSS 571.121 (see 3.11.10). The brake system of all vehicles post-production shall be burnished sufficient for the vehicles to meet the grade holding requirements of this purchase description.

3.10.17.1 Service brakes.

a. Mission I through V Vehicles. Service brakes shall meet the requirements of FMVSS 571.121, without regard for the exceptions of paragraph S3. In addition, Mission VB Vehicles service brakes shall bring the vehicle to a complete stop from a speed of 20 mph (32 km/hr) within 30 feet (9 M), measured from the point of brake application (to a tolerance of two (2) feet shall be acceptable). The service brakes shall hold the vehicle at GVW on a dry hard surface, 60% grade pointing either uphill or downhill.

b. Mission VI Vehicles. The LHST service brakes, under all conditions of loading shall stop within the distances specified by the FMVSS appropriate for the type of braking system used.

3.10.17.2 Parking brakes. The vehicle parking brake shall be capable of holding the chassis motionless in either direction on the grades and payloads specified in Table III, with the engine off and the transmission in neutral. An indicator light shall be provided to alert the crew when the parking brake is engaged (objective).

3.10.17.3 Emergency brakes.

a. Mission I, II, III, IV, VA and VC Vehicles (objective), Mission VB Vehicles (threshold). The emergency brake system, in the event of a single point failure in the service brake system, shall stop the truck at GVW on a 30% grade. The vehicle at GVW, on dry level primary roads, shall be capable of stopping within 170 feet (52 M) (measured at point of brake application) while traveling at least 30 mph (48 km/hr) and within 530 feet (162 M) while traveling at least 55 mph (90 km/hr). Emergency brakes shall activate after both the visual and audible low air pressure warnings have activated. Emergency braking shall include a means of stopping the vehicle in the event that any loss of air pressure occurs as a result of trailer breakaway. Emergency braking requirements shall be met without the use of the retarder.

b. Mission VI Vehicle. The LHST emergency braking system shall activate when the air supply from the prime mover ceases and shall apply the emergency brakes. The brakes when applied shall hold the LHST (at GVW) while on a 30% grade.

3.10.18 Mobility. The vehicles shall be capable of operating over primary (see 6.3.14) and secondary (see 6.3.19) roads, trails (see 6.3.22) and rough trails (see 6.3.18) for the mobility level stated herein, under the varied environmental conditions specified. The mobility characteristics shall equal or exceed those quantified by the Reference Mobility Model (RMM) in the following paragraphs.

3.10.18.1 Minimum mobility rating speeds (mph)

Mission IA and II Vehicles (threshold); Mission VA, VC Vehicles (objective)

	WEST GERMANY			MID-EAST		
	DRY	WET	SNOW	DRY	WET	SAND
Tactical High	8	7	7	9	8	1
Tactical Standard	13	12	10	13	13	2.5
Tactical Support	18.5	17.5	13.5	17	16	15

Mission IV (with patriot XM860 semitrailer only).

	WEST GERMANY			MID-EAST		
	DRY	WET	SNOW	DRY	WET	SAND
Tactical High	7	2.5	1.5	8	3	0.5
Tactical Standard	12	6.5	3.5	12	3	1
Tactical Support	17	16	4.5	15.5	14	14

Mission VB2 Vehicles

	WEST GERMANY			MID-EAST		
	DRY	WET	SNOW	DRY	WET	SAND
Truck W/MHC TACTICAL STD Vehicle W/MHC	14	3	11	14	14	1

at GCW	13	1	5	13	8	0.5

3.10.18.2 Maximum percent NO-GO.

Mission IA and II Vehicles (threshold); Mission VA, VC Vehicles (objective)

WEST GERMANY			MID-EAST		
DRY	WET	SNOW	DRY	WET	SAND
9	9	9	10	10	12

Mission IV Vehicles

WEST GERMANY			MID-EAST		
DRY	WET	SNOW	DRY	WET	SAND
9.0	14.0	19.0	3.0	7.5	28

Mission VB2 Vehicles

	WEST GERMANY			MID-EAST		
	DRY	WET	SNOW	DRY	WET	SAND
Truck W/MHC	6	34	15	5	5	14
Vehicle W/MHC at GCW	14	68	23	5	10	28

3.10.18.3 Vehicle Cone Index (VCI). The single pass VCI1 (fine grained) shall not exceed:

a) 36 for the Mission VB2 Vehicles w/MHC and 34 for the Mission VB1 Vehicles w/o MHC, and 50 for the Mission VB1 Vehicles at GCW, w/o MHC.

b) 29 for Mission II Vehicles (threshold) (objective - Mission I, III, IV, VA and VC Vehicles.

c) 38 for Mission IV Vehicles w/M860 patriot semitrailer.

3.10.18.4 Ride quality (threshold – Mission VB Vehicles; objective – Mission I, II, III, IV, VA and VC Vehicles). Vehicles at GVW shall attain no more than 6 watts average vertical absorbed power at all seating locations within the cab while negotiating a 0.7 inch (18 millimeter (mm)) Root Mean Square (RMS) course at speeds up to 17 mph (27 km/hr) and a 1.5 inch (38 mm) RMS course at speeds up to 12 mph (19 km/hr) with the tires at normal cross-country inflation pressure. The vehicles shall show no more than 2.5 g acceleration at the driver's station while negotiating half round obstacles of 8 inch (203 mm) height at a speed of at least 12 mph (19 km/hr). Whole body vibration shall meet the applicable frequency range to limit motion sickness, health comfort and perception (reference MIL-STD-1472 for guidance).

3.10.19 Reliability, Maintainability, and Durability (RM&D). Vehicles shall exhibit the reliability, maintainability and durability characteristics as specified herein, while operating on the terrain specified in Table VI, and when evaluated to the HEMTT and PLS Failure Definition Scoring Criteria (FDSC) (Appendices C, D and E). Conformance of RM&D requirements shall be verified by Government conducted technical and production tests. The Government shall unilaterally determine conformance of RM&D by scoring failure incidents and severity classification on each system using the HEMTT and PLS Family Failure Definition Scoring Criteria (FDSC).

3.10.19.1 Reliability. To determine conformance to the reliability requirements, reliability requirements shall be demonstrated at the paragraph specified point estimate (threshold) (80% confidence level - objective). Reliability shall be computed by dividing the total operating hour/mile by the total number of the appropriate failure category from the FDSC (Appendices C, D and E).

3.10.19.1.1 Mission I, II, III, IV, VA and VC Vehicles. Exclusive of the MHC and fuel loading/dispensing system, the vehicle shall meet or exceed the reliability requirement of 1500 Mean Miles Between Hardware Mission Failure (MMBHMF) (threshold) (2900 MMBHMF – objective).

3.10.19.1.1.1 Ancillary tanker equipment reliability. The tanker installed system, together with those auxiliary vehicle components which are required for its operation, shall meet or exceed the reliability requirement of 75 hours MTBHMF (threshold) (160 hours MTBHMF – objective).

3.10.19.1.1.2 Ancillary cargo equipment reliability. The vehicle installed material handling crane, together with those auxiliary vehicle components which are required for its operation, shall meet or exceed the reliability requirement of 75 hours MTBHMF (threshold) (200 hours MTBHMF – objective).

3.10.19.1.1.3 Ancillary wrecker equipment reliability. The MHC shall meet or exceed of the reliability requirement of 100 hours MTBHMF (threshold) (200 hours MTBHMF – objective). The truck installed vehicle recovery system, along with its associated subsystems shall meet or exceed the reliability requirement of 125 hours MTBHMF (threshold) (250 hours MTBHMF – objective).

3.10.19.1.1.4 Ancillary CBT equipment reliability. The CBT LHS shall meet or exceed acceptance criteria based on a test value of 81 Mean Missions Between Failures (MMBF). A mission consists of 20 miles of transporting distance and one launch/retrieval cycle. The 20 mile transporting distance consists of the following scenario: 12 miles of primary roads, 6 miles of secondary roads and 2 miles of cross country terrain. The reliability shall meet or exceed 81 missions between failures.

3.10.19.1.2 Mission VB Vehicles. The vehicle shall meet or exceed the reliability requirements of 2250 MMBHMF (threshold) (3200 MMBHMF – objective) for the truck, 2280 MMBHMF (threshold) (7100 MMBHMF – objective) for the trailer.

3.10.19.1.2.1 Material Handling Crane (MHC) reliability. The MHC shall meet or exceed the reliability requirement of 195 hours MTBHMF (threshold) (320 hours MTBHMF – objective).

3.10.19.2 Maintainability. To determine conformance to maintainability requirements, the Maintainability Ratio (MR) shall be calculated using the total chargeable scheduled and unscheduled maintenance man-hours divided by the total number operating mile/hour.

3.10.19.2.1 Maintenance ratio (MR). The Maintenance Ratio (MR) in terms of Maintenance Man-Hours per Operating Mile (MMH/OM) for the basic chassis and Maintenance Man-Hours per Operating Hour (MMH/OH) for the ancillary equipment shall be demonstrated on a basic chassis operating for a total test time of 20,000 miles plus a composite engine idle time necessary to operate the various ancillary equipment. All scheduled and unscheduled maintenance man-hours, excluding operator/crew checks and services, shall be included in this ratio.

3.10.19.2.2 Preventive Maintenance Checks and Services (PMCS) (objective). Preventive maintenance shall not exceed 10 minutes for before-operations checks, 10 minutes for after-operations checks, and 30 minutes for weekly PMCS. Replacement of components and modules and all repairs shall occur at the lowest possible level of maintenance, but should not increase the crew's responsibility.

3.10.19.2.3. Mission I, II, III, IV, VA and VC Vehicles. All type vehicles of this family shall be designed so that the following can be removed from the vehicle and replaced in less than four hours by a 4-man crew.

a. Transfer Case

All type vehicles of this family shall be designed so that each of the following can be removed from the vehicle and replaced in under four and one-half hours by a 4-man crew.

b. Engine (only)
c. Transmission (only)

d. Engine – Transmission Assembly

The four hour criteria include all preparation, i.e., hood removal, tilting the cab or draining fluids, etc. Routing, daily maintenance checks, i.e., engine oil, coolant level, battery liquid level, etc., must be readily accessible without the use of tools. Pre-operation fluid level checks shall not take longer than 5 minutes. Components of the chassis shall be accessible for servicing, repair, and replacement. Ease of maintenance provisions shall incorporate features insuring operating clearances and facilitating maintenance and service operations.

3.10.19.2.3.1 Vehicle Maintainability. The MR for the basic chassis shall not exceed 0.010 MMH/OM at organizational level, 0.002 MMH/OM at GS/DS level, for a total of 0.012 MMH/OM (objective). The MR for the basic chassis shall not exceed a total of 0.23 MMH/OM (threshold).

3.10.19.2.3.1.1 Ancillary tanker equipment maintainability. The tanker installed system, together with those auxiliary vehicle components which are required for its operation, shall not exceed 0.006 MMH/OH at organizational level, 0.004 MMH/OH at DS/GS level, for a total of 0.010 MMH/OH (objective). The tanker installed system, together with those auxiliary vehicle components which are required for its operation, shall not exceed a total of 0.09 MMH/OM (threshold).

3.10.19.2.3.1.2 Ancillary cargo equipment maintainability. The MR for Material Handling Crane shall not exceed 0.017 MMH/OH at organizational level, 0.011 MMH/OH at DS/GS level, for a total of 0.028 MMH/OH (objective). The MR for the Material Handling Crane shall not exceed a total of 0.13 MMH/OM (threshold).

3.10.19.2.3.1.3 Ancillary tractor equipment maintainability. The tractor variant and its unique subsystems shall meet or exceed the maintainability standards of the basic configuration (See 3.10.19.2.3.1).

3.10.19.2.3.1.4 Ancillary wrecker equipment maintainability. The MR for the MHC shall not exceed 0.020 MMH/OH at organizational level, 0.012 MMH/OH at DS/GS level, for a total of 0.032 MMH/OH (objective). The MR for the MHC shall not exceed a total of 0.075 MMH/OM (threshold). The MR for the truck installed vehicle recovery system, along with its associated subsystems shall not exceed 0.004 MMH/OH at organizational level, 0.003 MMH/OH at DS/GS level, for a total of 0.007 MMH/OH (objective). The MR for the truck installed vehicle recovery system, along with its associated subsystems shall not exceed a total of 0.062 MMH/OM (threshold).

3.10.19.2.3.1.5 Ancillary CBT equipment reliability. The CBT LHS shall have a maintenance ratio not more than 0.145 Maintenance Man-Hours per Mission (MMH/M) per launch cycle.

3.10.19.2.4. Mission VB Vehicles. The vehicle shall be designed so that the transfer case and the axle assembly, can each be completely removed and replaced within 8 man hours,

utilizing authorized tools and equipment. The truck shall also be designed so that the engine and transmission can each be completely removed and replaced within 13 man-hours utilizing authorized tools and equipment.

3.10.19.2.4.1 Vehicle maintainability. The MR for the truck shall not exceed 0.011 MMH/OM at organizational level, 0.002 MMH/OM at DS/GS level, for a total of 0.013 MMH/OM (threshold), and the MR for the trailer shall not exceed 0.0019 at organizational level, 0.0001 MMH/OH at DS/GS level, for a total of 0.002 MMH/OM (objective). The MR for the trailer shall not exceed a total of 0.004 MMH/OM (threshold).

3.10.19.2.4.1.1 MHC maintainability. The MR for the MHC shall not exceed 0.034 MMH/OH at organizational level, 0.021 MMH/OH at DS/GS level, for a total of 0.055 MMH/OH (objective). The MR for the MHC shall not exceed a total of 0.83 MMH/OM (threshold).

3.10.19.3 Durability for Mission I, II, III, IV, VA and VC Vehicles.

3.10.19.3.1 The vehicle shall not have less than a 60% probability of completing the first 32,000 kilometers (20,000 miles) of operation without overhaul, rebuild, or replacement of any of the following components.

1. Engine
2. Transmission
3. Transfer Case
4. Axles

3.10.19.3.2 The vehicle shall not have less than a 90% probability of completing the first 32,000 kilometers (20,000 miles) of operation without cracking or significant deformation of the frame and major supporting members.

3.10.19.3.3 The CBT LHS with Bridge Adapter Pallet (BAP) shall be capable of achieving 1380 launch/retrieval cycles without a durability failure.

3.10.20 Electromagnetic emissions and High Altitude Electromagnetic Pulse (HAEMP).

3.10.20.1 All Mission Variants (objective). Variants shall comply with applicable EMI and electromagnetic emission susceptibility requirements of MIL-STD-461. All variants shall be hardened against High Altitude Electromagnetic Pulse. The specific levels of protection for all cases are classified confidential. Operation through a HAEMP event is not required and the re-cycling of power to restore mission critical functions is acceptable.

3.10.20.2 Mission I, II, III, IV, VA and VC Vehicles (threshold). All vehicle types shall comply with the requirements for Class C1 equipment and systems as per MIL-STD-461B steady state radiated emissions over a frequency range of 30 to 75.95 MHZ and tested in accordance with MIL-STD-462 Interim Notice 4.

3.10.20.3 Mission VB and VI Vehicles (threshold). The vehicle shall conform to electromagnetic emissions/interference (EME/EMI) characteristic levels for classes A3 and Cl, parts 4 & 8 as specified in MIL-STD-461C and tested in accordance with MIL-STD-462 Interim Notice 5. The vehicle at GCW shall be fully operable within the allotted downtimes as specified in figures A10, A11 and Table A3 of QSTAG 244 edition 3.

3.10.21 Nuclear, Biological, and Chemical (NBC) Warfare for Mission I, II, III, IV, VA and VC Vehicles (objective). The systems shall be designed and constructed to survive the set of nuclear effect levels that are stated in the PATRIOT requirements document and perform all mission essential functions.

3.11 Components. Components shall allow easy servicing utilizing common tools available at the operator/unit level. All reservoirs, filters, drains, vents and valves shall be easily accessible and identified for inspection and servicing. Drain plugs installed in engine, transmission, transfer case, axles, and hydraulic reservoir shall be of the permanent magnet type and readily accessible. The function of all drains, vents and valve openings shall not adversely affect the function of or damage to any other vehicle component (i.e. battery box) (objective). Provisions shall be in place to prevent draining fluids from contacting other components of the vehicle. All seals shall restrict the entrance of all foreign materials and prevent the leaking of lubricants. At a minimum, the engine, transmission, antilock brake system (if installed) and Central Tire Inflation System (applicable to Mission VB Vehicles) shall be electronically controlled (threshold – Mission VB Vehicles; objective – Mission I, II, III, IV, VA and VC Vehicles). All lines and fittings shall be secured in such a manner to prevent rubbing on adjacent lines or vehicle appendages. The variants shall be equipped with all items necessary to accomplish all mission objectives and tasks. The variants shall have mounting and stowage provisions for all Basic Issue Items (BII).

3.11.1 Components and vehicle ratings. Vehicle/trailer ratings shall be manufacturer's current published ratings for on/off road operating conditions as applicable to the vehicle/trailer type. Component and vehicular ratings shall not be raised to meet the requirements of the specification. When published ratings are not available, component manufacturer's verification of rating must be submitted to the Engineering Office of the Procuring Activity. Maximum axle loads allowed by all State and NATO countries shall be complied within relation to load distribution, front to rear axles (except for Wrecker with lifted/towed vehicle) (see 3.10.1).

3.11.2 Engine.

3.11.2.1 Engine cooling system. The cooling system shall meet the requirements of SAE J1436 except for the following:

a. A completely drained system shall fill with cold water at a minimum of 3 gpm with hose until filler neck overflows.

b. The system shall be able to have a minimum of 10% of its volume drawn off before

aeration is seen in the engine outlet sight glass.

Inspection of fluid fill levels shall be accomplished without removal of caps from coolers or surge tanks. A cooling system shall be furnished capable of maintaining engine and transmission operating temperatures within the specified limits while operating continuously under full load at a 0.55 Tractive Effort to Gross Vehicle Weight ratio (TE/GVW) for Mission VB Vehicles and 0.6 TE/GVW for Mission I, II, III, IV, VA and VC Vehicles under the maximum conditions of 120 degrees F (49 degrees C) and the cooling system shall be capable of not exceeding temperature limits while operating at rated engine power. The radiator shall be guarded against thrown stones and damage by contact with vegetation.

3.11.2.1.1 Fan clutch. If a fan clutch is used, a positive lockup shall be provided in case of a clutch or a control system failure.

3.11.2.2 Permanent oil filtration (objective). A permanent filtration system with a filter rating of 10 microns or less shall be installed. Cleanable filters, if used, shall have a filtering rating of at most 10 microns. A restriction indicator cab mounted light shall be used to indicate when the element needs cleaning.

3.11.2.3 Engine speed control. Tamper resistant means shall be provided to limit the maximum engine speed to the engine manufacturer's maximum recommended operating speed. The accelerator control system shall conform to FMVSS 571.124.

3.11.2.4 Air cleaner. The vehicle shall incorporate an air cleaner that complies with the requirements of MIL-PRF-62048, Air cleaner, automotive, heavy duty dry type, except that the cleaner shall provide a minimum dust capacity sufficient for a 20 hour service life (threshold) for Mission I, II, III, IV, VA and VC Vehicles, 60 hour service life (threshold) for Mission VB Vehicles, without removal and cleaning. The induction air ducts shall not require disassembly for normal vehicle maintenance or element servicing. Air cleaner restriction indicator, visible from the driver's seat, shall be provided. The restriction indicator shall retain and display the highest restriction level attained during vehicle operation. The indicator shall be resettable from inside the cab and shall retain the reading after the engine is shut off.

3.11.2.5 Retarder. A retarder with modulated driver control shall be provided which develops at least 70% of the rated horsepower output of the engine as measured at the wheels.

3.11.2.6 Sampling valves. Oil sampling valves (reference MIL-V-81940, part number M81940/2-1), shall be provided in a readily accessible location for the engine, transmission, and hydraulic system. The oil sampling valves shall withdraw from the oil pressure galleys ahead of the oil filters while the engine is running. The valves shall be located in such a manner as to insure that personnel shall not be exposed to danger when taking samples with the engine running. Each sampling valve location shall be labeled to easily identify the source of the sample.

3.11.2.7 Visual filter condition indicators (objective). All oil filters on the steering and

hydraulic system shall include visual filter condition indicators to determine need for replacement.

3.11.3 Electrical system. Electrical system shall be in accordance with Federal Motor Carrier Safety Regulations 393.27 through 393.33. Variants shall be equipped with a 24 VDC electrical system with either a 12 VDC lighting system or a 24 VDC lighting system. Electrical systems shall be waterproof in accordance with Appendix A with the exception of components and connections inside the cab or other enclosures. Circuits and components shall be protected from corrosion by the use of corrosion resisting materials or by the application of corrosion resisting compound that is readily removable for maintenance (objective). The 24 VDC electrical circuits shall conform to the limits prescribed in MIL-STD-1275. Reverse polarity and over-voltage protection shall be incorporated into the electrical system (threshold), all electrical systems (objective). All manual circuit breakers shall be readily accessible to facilitate manual resetting. Circuits shall be identified with the contractor's code for electrical wiring and electrical components. A manually operated, keyless ignition switch with “off”, “on” and “start” positions shall be provided.

3.11.3.1 Electrical accessories (objective). Provisions to mount 2 additional circuit breakers shall be provided on each bus, in addition to those items suggested by paragraph 3.11.20. A minimum of one dedicated Meals Ready to Eat MRE/Water Heater outlet, and a minimum of 3 convenience outlets (12/24v including on/off switch) shall be provided as a power source for portable electrical equipment. The MRE/Water Heater shall be mounted in a location to discourage use during vehicle movement. A grounding circuit shall be autonomous and separate from the chassis.

3.11.3.2 Alternator.

3.11.3.2.1 Mission I, II, III, IV, VA and VC Vehicles. The vehicle shall be equipped with a 24 volt DC, 130 amp minimum, alternator capable of providing enough current to operate all Original Equipment Manufacturer (OEM) components on the vehicle while the engine is idling. The regulator shall be temperature compensated.

3.11.3.2.2 Mission VB Vehicles. The vehicle shall be equipped with a dual voltage (14 and 28 volt) 200 amp minimum, brushless, negative ground alternator capable of providing enough current to operate all Original Equipment Manufacturer (OEM) components on the vehicle while the engine is idling. The regulator shall be temperature compensated.

3.11.3.3 Lighting. All clearance lights, marker lights and military composite lights shall be LED (threshold). All interior lighting shall be LED (objective). The vehicle exterior and interior lights shall be protected to preclude any damage when interfacing with other vehicles or ancillary equipment and shall be protected from terrain and natural obstacles while traveling cross country. The vehicle shall be equipped with lamps, reflective devices, and associated equipment as specified per FMVSS 571.108. Actuation of the brakes shall override the vehicle hazard lights. All indicators and gauges shall be illuminated in service mode. LHST lighting shall be configured to meet all referenced requirements when the LHST is loaded or unloaded.

3.11.3.4 Headlights. Equip the vehicle with headlights. The headlight height requirements in FMVSS 571.108 do not apply. Headlights shall meet DOT illumination requirements and 24 volt headlights are permitted on Mission I, II, III, VA and VC Vehicles.

3.11.3.5 Work lamps. Mission Vehicles shall be equipped with a minimum of 2 permanently mounted work lamps (threshold - Mission III and IV Vehicles; objective – Mission I, II and V Vehicles) to facilitate night operation and maintenance and meet the requirements below:

a. Lamp housing shall be mounted in a protected position and such that the lamps are aimed at areas around the rear and sides of the vehicle.

b. The work lamps shall not be less than 4 inches in diameter and a minimum of 1,500 candlepower (c.p.) and be provided with an individual on/off switch plus a master switch in the vehicle cab accessible to the driver.

c. An on/off switch accessible from the driver's position shall be furnished and operate individually from the light itself.

Mission III and IV Vehicles shall have 2 additional work lamps (threshold) that shall be demountable and provide the capability to permit hand illumination of the truck pintle area and 20 ft. beyond.

3.11.3.6 Convoy warning lights. There shall be provisions for readily mounting and connecting a commercial, yellow strobe type warning light on the vehicle. The strobe light shall have a light intensity equal to or greater than warning light A-A-52418. The warning light shall be visible for 360 degrees and shall not be capable of being activated during the blackout mode (threshold – Mission VB Vehicles, objective – Mission I, II, III, IV, VA and VC Vehicles).

3.11.3.7 Secure lighting. A 24 VDC or 12 VDC blackout lighting system shall be furnished. The blackout system shall be controlled by an interior switch, readily accessible to the driver, which shall prevent accidental disengagement of the blackout system from the blackout mode and shall automatically disengage all lights and devices required by paragraph 3.11.3.3, 3.11.3.4, 3.11.3.5, 3.11.3.6, the electric horn (see 3.11.3.11) and backup alarm (see 3.11.3.18). Exterior blackout lighting shall consist of, either separately mounted or in a composite light assembly, one blackout drive lamp (reference 12360910), and two rear mounted blackout stop lamp assemblies (reference 12360870). Interior blackout lighting shall be as required for safe operation of the vehicle and compatible with night vision devices (i.e. night goggles) in use at time of fielding. The emission of any vehicle interior or exterior light source which may be illuminated (including warning lights) in the blackout mode, shall be limited to the visible spectrum (380 to 700 nanometers) (threshold – Mission VB Vehicles, objective – Mission I, II, III, IV, VA and VC Vehicles). No energy shall be emitted in the 700 to 1200 nanometer portion of the electromagnetic (EM) spectrum. (Emission peaks shall not exceed 1% relative to the peak emission in the visible spectrum.) Colored warning lights shall be maintained as necessary while

meeting the above requirements.

3.11.3.8 Communication equipment (objective). Adequate space and power hook-up (24 volt, 100 amp Power Cable (A3014039) shall be provided as part of the vehicle) provisions shall be available inside the cab and convenient to the driver for the installation of the SINCGARS AN/VRC-90 Radio Set (A3013814) including the MT6352 mount (A3019214) and future electronic equipment such as position and navigation equipment (see 3.11.20). Holes shall be provided for attachment of an antenna support for mounting of an AS-3684 antenna (A3013842). All unused cab holes shall be closed with removable plugs. Equipment shall be operable from all seating positions inside the cab.

3.11.3.8.1. Mission I, II, III, IV, VA and VC Vehicles (threshold). A space allowance and power hook-up provisions shall be available inside the cab convenient to the driver, for the installation of the AN/VRC-46 radio. Holes shall be provided in the cab for attachment of all items and for passage of cables through metal panels. Holes shall provided in the spare tire carrier for attachment of SCD189023 antenna support assembly for mounting of one AS-1729 ( )/VRC antenna. All cab holes shall be filled with removable plugs or threaded fasteners.

3.11.3.8.2 Mission VB Vehicles (threshold). The truck shall accept installation and connection of the SINGARS AN/VRC-90 radio including the MT6352 mount (A3019214) and future electronic equipment such as position and navigation equipment. Holes shall be provided for attachment of an antenna support for mounting of an AS-3684 antenna (A3013842). All unused cab holes shall be closed with removable plugs. Equipment shall be operable from all seating positions inside the cab.

3.11.3.9 Wiring. All wiring shall be in accordance with SAE-J1292 and SAE-J163. Unless otherwise specified herein, wiring not protected from accidental contact with troops, terrain or vegetation shall be a minimum of 14 gauge. Vehicle junction boxes/connectors shall be furnished at multiple disconnect points.

3.11.3.10 Batteries.

3.11.3.10.1 Threshold. Batteries shall be IAW MS 52149. Batteries shall be readily accessible for service and shall be protected from the environment. Checking the battery electrolyte levels shall not require special tools. The battery carrier shall be insulated to prevent short circuiting during maintenance and operation. The battery carrier shall not be located in the cab or vented into the cab. Batteries should be as close to the starter as possible.

3.11.3.10.2 Objective. Batteries shall be in accordance with ATPD 2206R6. Batteries shall be readily accessible for service and shall be protected from the environment. The battery carrier shall be insulated to prevent short circuiting during maintenance and operation. The battery carrier shall not be located in the cab or vented into the cab. Brass battery terminal connectors shall be used to increase conductivity, allow for multiple battery hookups, and prevent terminal corrosion.

3.11.3.11 Horn. The vehicle shall be equipped with a 12 or 24 volt electric horn conforming to A-A-52525, Type II**.** The vehicle shall also be equipped with an air horn IAW A-A-52525, Type I. The air horn shall function independent of the electric horn and shall be activated by a pull cord within immediate reach of the driver.

3.11.3.12 Electrical connectors. All electrical connector bodies, pins and contacts shall be made of corrosion resistant material or shall be coated with a corrosion resistant material that is readily removable for maintenance. The vehicle shall be equipped with all connectors necessary to operate electrical components of towed military trailers. Connectors shall allow for disconnection and reconnection without damage. Intervehicle slaving connections will be accomplished through cable and plug assembly, Intervehicle Power Cable No. 11682336. The slave receptacle shall be located so as to preclude damage, corrosion and contamination. The receptacle cover shall stay in place under all mission scenarios. A 7-pin connector conforming to SAE J560 shall be located at the front and rear of the vehicle and shall be integrated with the 12 volt lighting system. A 12 pin NATO STANAG 4007 connector shall be located at the rear of the vehicle and shall be integrated into the blackout lighting system. The LHST shall be equipped with one waterproof NATO STANAG 4007 compliant 12- contact receptacle with cover and one waterproof SAE J560 compliant 7-contact receptacle with cover, installed at the front of the LHST. Cables of sufficient length to reach the towing vehicle without interference during operation and capable of connecting to a 7 & 12 pin connector shall be provided on the LHST. Waterproof, shelled connectors shall be utilized for all electrical connectors.

3.11.3.12.1 LHST bridging light bar. LHST shall be equipped to accept the installation and operation of a bridging light bar.

3.11.3.13 Instruments/switches. The vehicle shall be equipped with gauges/indicators, which shall be readily visible to the driver and illuminated for night operation. Gauges may be replaced by an on board message center. Gauges/indicator shall include as a minimum, fuel level, engine coolant temperature, transmission fluid temperature, engine oil pressure, engine tachometer, speedometer/odometer, voltmeter, air pressure (air assist vehicle/trailer brakes), brake warning, park brake on (objective) and air filter gauge and Power Take-Off (PTO) engagement light. The speedometer shall be calibrated in both MPH and KPH. An odometer shall be provided to indicate mileage and kilometers (threshold – Mission VB Vehicles; objective – Mission I, II, III, IV, VA and VC Vehicles). Warning lights shall be provided and shall include, engine temperature, headlight high beam, emergency brake engaged (objective) and an ABS error indicator (as applicable). There shall be a warning light and an audible warning to indicate low air pressure, and high coolant temperature. The warning lights shall be capable of being activated while in the blackout mode (threshold – Mission I, II, III, IV, VA and VC Vehicles), and shall meet the secure lighting requirements of 3.11.3.7 (threshold – Mission VB Vehicles; objective – Mission I, II, III, IV, VA and VC Vehicles). The audible warning indicators shall be inactive while in the blackout mode (objective). There shall also be self canceling turn indicators (threshold – Mission VB Vehicles; objective – Mission I, II, III, IV, VA and VC Vehicles), emergency flasher system, light switch which controls service lights, blackout lights, driving and instrument panel lights. Additional instrumentation/indicators requirements are referenced in 3.11.2.2, 3.11.2.4 and 3.11.2.7. Gauges and switches shall be color coded on

the face scale indicators to indicate information such as: desirable operating range in green; cautious, undesirable, or ineffective usage in yellow; dangerous or harmful operating level in red. Lenses shall not discolor throughout the life of the vehicle. Two map lights with one located in each upper rear corner of the cab with individual switches shall be provided (objective). These lights shall be overridden during blackout mode.

3.11.3.14 Master Power Cutoff Switch (objective). The vehicle shall be equipped with a master power cutoff switch that, when activated, disconnects power to all systems in the truck and towed trailer. The switch shall be capable of handling both 12 and 24-volt systems. Switch shall have a failsafe system that prevents damage for shutoff.

3.11.3.15 Pre-lubrication system (objective). A pre-lubrication system with an oil evacuation system shall be included that shall pressurize the filter and all oil passages prior to cranking. The evacuation system shall allow for expedient oil changes and ease of oil sampling.

3.11.3.16 Databus connectors (objective). The vehicle data bus(s) shall be defined by the subsystems employed (i.e. SAE J1708, J1939, J1850 or MIL-STD-1553). The connectors shall be standard 9-pin DDL type (Military connector 10). Databus-sensor connections shall interface with the engine, transmission, antilock brake system, Central Tire Inflation System and as many other electronic subsystems as possible. A sensor suite shall be installed on the vehicle, which shall, at a minimum, monitor hydraulic, pneumatic, and electrical systems in order to provide prognostic and diagnostic capability.

3.11.3.17 Diagnostic tools.

3.11.3.17.1 Diagnostic Connector Assembly (DCA) (threshold). The vehicle shall be provided with direct and unrestricted access to a DCA for Simplified Test Equipment/Internal Combustion Engine Reprogrammable (STE/ICE-R) IAW ATPD 2205 and CR 82-588-003. The Diagnostic Connector, TACOM dwg 12258941, on the vehicle shall interface with the STE/ICE-R Test Equipment. The DCA shall have the capability to perform the measurements listed in Table II of ATPD 2205. Sufficient sizes and quantities of transducers shall be provided to support diagnosis of the vehicle IAW Table 3-1, (except for electrolyte sensor) of CR 82-588-003. For Mission VB Vehicles, a fuel shut-off method shall be provided for running compression unbalance tests and Built in Test Equipment (BITE) shall be provided. BITE shall include an in-cab read-out diagnostic display (stop engine and check engine lights) and the capability to flash out diagnostic codes that uniquely identify detected faults. Data bus communications for electronic controlled drivetrain components shall be IAW SAE J1587 and SAE J1708.

3.11.3.17.2 Diagnostic tools (objective). Diagnostic tools shall be available which allows for complete diagnostic review of all vehicle systems through databus connections. The vehicle shall have embedded diagnostics capable of identifying system failures and isolating to the failed component 90% of the time. These identified failures shall be passed into the Integrated Electronic Technical Manual (IETM) that shall be developed using the TACOM-owned Electronic Maintenance System (EMS) Software, provided as Government Furnished Information (GFI). These failure modes shall be identified on a within-the-cab display that can

also be read through an external source (system shall have a standard computer bus that shall allow connection with another computer to transfer this data or attachable RF limit. The manufacturer shall provide all standard proprietary data, data descriptions and program/fault codes necessary to communicate with the electronic control modules and to maintain the electronically controlled modules and to maintain the electronically controlled subsystems. The test/maintenance equipment connectors and circuits to all data buses shall be compatible with current standard test equipment (i.e. Soldier Portable On-system Repair Tool (SPORT)). Diagnostic assembly shall be capable of interfacing with (both hardware and software) either Movement Tracking System (MTS) or Force XXI Battle Command Brigade and Below (FBCB2) (see 3.11.20.1, 3.11.20.2).

3.11.3.17.2.1 Data Storage (objective). The vehicle shall be equipped with a system that shall be capable of accumulating, recording, and storing (90 days minimum) vehicle operational data such as coolant temperature, oil temperature, oil pressure, throttle position, speed, timing, fuel pressure and vehicle speed. The data shall be protected by security measures from tampering.

3.11.3.18 Backup alarm. A backup alarm shall be installed on the vehicle in accordance with SAE J994 requirements (threshold -Mission VB Vehicles; objective – Mission I, II, III, IV, VA and VC Vehicles).

3.11.4 Fuel system. Fuel system shall conform to FMCSR 393.65 and 393.67. Fuel lines shall be routed and/or protected to preclude foreign object contact during operation.

3.11.4.1 Fuel tanks. All vehicle types shall be equipped with corrosion resistant fuel tank(s) of sufficient volume to satisfy the vehicle range requirement of paragraph 3.10.8. When more than one fuel tank is furnished, means shall be provided to assure equalized level and draw in the tanks. Internally carried fuel includes all fuel tanks at no more than 95% full with 5% allowed for ullage. If two or more tanks are provided, a manual shut-off valve shall be furnished with each tank. Fuel tank(s) shall be provided with minimum 3-inch diameter, safety-type tank filler cap or caps. Filler caps shall be located to preclude mud build up and captive chained to filler neck. Removable strainers and drain plug(s) are required. A sealed filler cap and vent is required for each tank for fording requirements. The fuel tank/line venting system shall not be combined or inter-connected with any other vent system. Fuel tank fill ports shall be capable of receiving fuel-dispensing nozzles of a minimum of 2 inches (50.3 mm) in diameter.

3.11.4.2 Fuel/water separator. All vehicles shall be equipped with fuel water separators having heating elements and drain provisions. A shield shall be provided which surrounds the fuel/water separator bowl to prevent damage from thrown stones or personnel operating near the fuel/water separator. The shield shall not impair visibility of the fluid level in the bowl or accessibility to the drain.

3.11.5 Exhaust system. The exhaust system shall conform to FMCSR 393.83. The exhaust system as installed shall be gas tight and leakproof to prevent the accumulation of exhaust gas in the occupied areas in accordance with best commercial practice. The exhaust

pipe(s) shall be configured to prevent entry of water when vehicle is not operating. Exhaust mufflers and exhaust pipes shall be corrosion resistant and shall be furnished with adequate guards/shielding to prevent personnel contact.

3.11.5.1 Toxic gas exposure. Concentrations of Carbon Monoxide (CO) in the cab or at any operator's station/position shall not exceed 50 parts per million under any operating condition. Nitrogen dioxide, ammonia, nitric oxide sulfur dioxide, ether and other harmful gases generated, shall be limited to concentrations not to exceed those specified in OSHA, Title 29 CFR, Part 1910.1000.

3.11.6 Gear Train.

3.11.6.1 Transmission. The transmission shall be an automatic and shall have a gear range capable of meeting the performance specification as stated herein. The main transmission, shall include the following:

a. A downshift inhibitor system that prevents driver shift control action from overspeeding or damaging engine, transmission, or drive train components.

b. Starter Interlock. The engine starter shall be inoperative when the transmission shift lever is in a forward or reverse drive position.

c. A means to manually select and identify the gear range (see 3.11.18).

d. If hydraulically powered, a neutral interlock provision shall be provided on all vehicles equipped with auxiliary powered equipment (with the exception of the self-recovery winch) to prevent high idle actuation of the engine throttle unless the transmission is in neutral and the PTO is engaged for Mission I, II, III, IV, VA and VC Vehicles. A neutral interlock shall be provided which shall allow the truck to start only in neutral for Mission VB Vehicles.

3.11.6.2 Transfer case. If utilized, the transfer case shall be installed which has the ability to provide all-wheel drive. If a single speed transfer case is used, it shall contain a planetary differential (threshold – Mission VB Vehicles; objective – Mission I, II, III, IV, VA and VC Vehicles) that shall provide full time all-wheel drive. A multi-speed transfer case, if used, shall provide a low range speed capability of at least 20 mph (32 kmh).

3.11.6.3 Power Take-Off (PTO) openings. PTO openings shall be provided and shall be driven at engine speed, independent of transmission operation (threshold – Mission VB Vehicles; objective – Mission I, II, III< IV, VA and VC Vehicles). On Mission IV Vehicles one of the PTO locations shall be of sufficient capacity to deliver a minimum of 100 hp (150 hp objective) while the vehicle is in motion. The PTO will be suitable for power assisted semitrailer axles which would be driven hydraulically from this PTO.

3.11.6.4 Steering. Power steering shall be furnished and have full limit steer when the vehicle is stationary while at GCW. In the event power assist is lost, the system shall be

manually steerable and capable of being brought to a safe stop (threshold). The system at all payload conditions shall meet the requirement of the TECOM/CSTA test methodology for Dead Engine Steering Test, "Y-Course", derived from the Allied Vehicle Testing Publication (AVTP), No. 03-30WT (objective). Throughout its entire steering arc (lock-to-lock) and including maximum tire side wall deflection, no components of the steering system shall contact or bind. All interface points within the steering system which requires lubrication shall utilize permanently lubricated joints (objective) (see 3.5.1). The steering wheel shall be capable of being locked with a standard padlock A-A-59487 (Part Identification Number AA59487-1BC).

3.11.7 External, MHC or LHS hydraulics. The hydraulic system, if used, shall have provisions for operating a crane and/or other hydraulic equipment external to the vehicle and include such provisions for future use. Removable caps or plugs shall be installed at the points of attachment of the external hydraulic system to prevent dirt or other foreign objects from contaminating the system.

3.11.7.1 Hydraulic reservoir. Vehicle shall have a hydraulic reservoir of sufficient capacity to operate vehicle systems and auxiliary equipment for all mission types. Reservoir shall be provided with at least the following:

a. Filter(s) shall be readily accessible for cleaning or replacement without draining the reservoir in all hydraulic circuits. Bypasses shall be furnished where necessary to protect filters during cold temperature operation.

b. Baffles to preclude foaming.

c. Dip stick, sight gage, and pressure vented type filler cap of no less than 5 psi.

d. Access size to allow manual cleaning of the reservoir.

e. Reservoir shall allow for hydraulic maintenance without draining the systems (objective).

f. Hydraulic system cooler (threshold – Mission VB Vehicles; objective Mission I, II, III, IV, VA and VC Vehicles).

3.11.7.2 Hydraulic hoses and fittings. High pressure hoses and fittings shall conform to the requirements of SAE J516, SAE J517 and SAE J343.

3.11.8 Axles and suspension.

3.11.8.1 Axle lubrication. All axles shall be properly vented and equipped with lubricated wheel bearings and seals adequate to meet fording requirements (see 3.10.15).

3.11.8.2 Suspension.

a. Mission I, II, III, IV, VA and VC Vehicles shall limit the vertical natural frequency of the sprung mass to a maximum of 2 Hz at GVW.

b. The suspension design of Mission VB Vehicles shall limit the vertical natural frequency of the sprung mass to a maximum of 1.6 Hertz (Hz) at GVW and 2.2 Hz at VCW.

3.11.9 Rims and tires. Rims and tires shall meet the requirements of SAE J1992 and conform to FMVSS 571.119 and 571.120. Vehicle (threshold) and trailer (objective) tires shall be a tubeless radial design with bolt-together rims and beadlock.

All tire and rim ratings shall conform to the Tire and Rim Association (TRA) 1 or the European Tire and Rim Technical Organization (ETRTO) Standards Manual for the maximum GCW and maximum speed of the vehicle. The vehicle shall have tires with tread design that maximizes off-road mobility but maintains safe on-road handling. All wheel assemblies shall be interchangeable across all vehicle/trailer types (objective). Tires shall have a minimum tread life of 10,000 miles (threshold, except for Mission III Vehicles (objective)), 18,000-mi. (28,968-km) (objective).

3.11.9.1 Spare tire and wheel assembly. A spare wheel and tire assembly meeting requirements of 3.11.9 shall be provided on each variant. For Mission I through V Vehicles, a mechanical assist device shall be provided which shall permit dismounting and restowing of the spare assembly by no more than two soldiers. All vehicles shall be equipped with sufficient tools and equipment, including jack, to facilitate tire/wheel removal on the system on both hard and soft surfaces within 30 minutes by no more than two soldiers. On level, hard ground the one jack shall be used to lift the variants from a flat tire height to a height necessary to install a fully inflated tire without the need for a second jack (objective).

3.11.9.2 Run-flat capability (objective). If provided, a run-flat capability shall be provided that permits safe driving on a flat tire at least 30 miles at speeds at least 30 mph over the OMS/MP terrain (reference Table VI, VII, VIII and IX). If provided, spare tire and wheel is not applicable.

3.11.9.3 Wheel splash and stone throw protection. Splash shields (quarter fenders) ahead of the rear wheels and quick-change anti-sail flexible mud flaps shall be installed to the rear of the rear wheels in accordance with normal commercial practice. Mud flap installations at rear wheels, shall conform to the rear wheel splash and stone throw protection provisions of SAE J682. Mud flaps shall be installed to prevent mud from the inner axles from being thrown on the mirrors, back of the cab, into the winch operator's station, into the area between the back of the cab, and the vehicle body (objective). Mud flaps on the tractor shall be mounted to react passively without damage to flaps or semitrailer in turning and backing situation without operator intervention, and shall also be removable using only on-board hand tools (objective). Rear wheel fenders to reduce wheel debris splash up on the trailer shall be incorporated (objective).

3.11.9.4 Tire chains. All variants shall have sufficient clearance in accordance with SAE

J683 to allow the safe operation of the variants with standard military tire chains (A-A-52507) mounted on both tires of each non-steering axle and any combination of one or more non-steering axles.

3.11.9.5 Limp home capability (threshold - Mission I, II, III, IV, VA and VC Vehicles; objective – Mission VB Vehicles). A means of raising one wheel off the ground using a developed system of chains and/or cable and hooks shall be provided for each vehicle. Storage space shall be provided. This capability shall be for emergency operation only in case of wheel bearing failure, damaged wheel, inability to change wheel/tire, etc.

3.11.9.6 Central tire inflation system (CTIS). A CTIS shall be provided on Mission VB Vehicles as specified herein.

3.11.9.6.1 Tire pressure control. The system shall allow the driver to adjust all truck tires to any one of four preset tire pressures (highway, cross country, mud/snow/sand, emergency). The system control shall be located so that the system may be activated while the driver continues to operate the Mission VB Vehicle.

3.11.9.6.2 Spare tire. The spare tire shall be equipped with all CTIS provisions, which allows for immediate installation.

3.11.9.6.3 Manual tire inflation/deflation. The system shall provide for the isolation of any or all tires from the CTIS in the event of CTIS failure for any reason. Valves for manual inflation shall be readily accessible and compatible with the standard on-board inflation system.

3.11.9.6.4 Air-priority system. The CTIS shall incorporate sufficient safeguards to assure that air pressure necessary to continue safe operation of the Mission VB System shall be available at all times during activation of CTIS or in the event of a CTIS failure. Use of brakes is the minimum requirement for safe operation.

3.11.9.6.5 Speed/pressure control warning. The CTIS shall include sensing of the Mission VB Vehicle speed and comparing indicated speed to the maximum allowable speed for each control setting. In the event that the vehicle average speed exceeds maximum allowable speed for that setting for a period of more than one minute, a panel mounted light shall activate to warn the driver of this condition until the system has automatically inflated to the appropriate pressure.

3.11.9.6.6 Maintenance of tire pressure. With the CTIS in operation, tire pressure shall be checked and adjusted at intervals necessary to assure that no more than 3 psi variation exists between selected pressure and actual pressure except during the inflation/deflation operation caused by the selection of a new tire pressure. With the CTIS not in operation and the Mission VB Vehicle engine not running after 24 hours, the tire pressure shall not drop below 97% of the pressure setting which existed before the vehicle was stopped. No action shall be required of crew personnel beyond normal shutdown to meet this requirement.

3.11.9.6.7 Time to inflation/deflation. The CTIS shall be capable of deflation within the

time constraints as listed below, (minutes: seconds). Inflation times shall not exceed the lower of those which the tire manufacturer shall provide warranty for when the Mission VB Vehicle is traveling at the top speed of the next highest pressure setting during inflation, or the following:

Inflation

From	To	Maximum Time Allowed
Cross-country	Highway	12:30
Mud/Snow/Sand	Cross-country	5:30
Emergency	Mud/Snow/Sand	3:00

Deflation

Highway	Cross-country	4:00
Cross-country	Mud/Snow/Sand	4:00
Mud/Snow/Sand	Emergency	3:00

3.11.10 Brake configuration. Unless otherwise specified in this purchase description, brakes shall conform to Federal Motor Vehicles Safety Standards (FMVSS) 571.121 and Federal Motor Carriers Safety Regulations (FMCSR) 393.40 through 393.42 (b), 393.43, and 393.45 through 393.52. An Antilock Brake System as described in FMCSR 393.55 and FMVSS 571.121 shall be considered an objective of this document and is not mandatory. All brakes shall be releasable from the cab in the tactical environment in the event of emergency lock-up per FMVSS 393.41.c. Brake apply cylinders/cams, associated lines and components shall be located to minimize exposure to "road hazards" or cause reduced ground clearance.

3.11.10.1 Split apply circuitry. Each circuit is protected from leaks elsewhere by check valves providing emergency stopping capability. No air shall be used directly from the "wet" tank except for the governor pressure signal. Air for all accessories shall be taken from one tap on either one of the apply circuit reservoirs and that tap will be provided with a shut off valve.

3.11.10.2 Trailer brake control system.

3.11.10.2.1 Semitrailer requirements for Mission IV Vehicles. A complete semitrailer brake control system shall be furnished that includes the following:

a. Two connecting air hoses adequate in length, equipped with coiled spring hose guards and “glad hand” quick connectors on trailer end of hoses. Hoses shall reach from the vehicle mounted pogo stick to the semitrailers specified in 3.12.5.4 and connect to the trailer brake system.

b. A wiring harness and connector to mate with the electrical system on the semitrailers specified in 3.12.5.4. The interface shall occur in the same location as the air brake line

interface. The interface connector shall be in accordance with SAE J849, 12 pin, 24-volt plug and receptacle.

3.11.10.2.2 Trailer requirements for all Mission Vehicles. The requirements are the same as those for a semitrailer (see 3.11.10.2.1) except that the interface connections shall occur at the rear of the vehicle. The air line and electrical connectors shall be rigidly mounted in a protected location at the rear end of the vehicle frame but also located to facilitate the easy connection of the mating lines/harness from the trailer.

3.11.10.3 Glad hands. Two glad hand type air line coupler conforming to SAE J318, figure 1 (service) and figure 2 (emergency), with captively retained dummy couplers at both the front and rear of the vehicles shall be provided to permit a towing vehicle to supply air to the reservoirs on the towed vehicle and to apply the towed vehicles brakes (LHST). Two glad hand type air line coupler conforming to SAE J318, figure 1 (service) and figure 2 (emergency), with captively retained dummy couplers at the front of the LHST shall also be provided. Glad hand identification shall be in accordance with SAE J318.

3.11.10.4 Air compressor.

3.11.10.4.1 Mission I, II, III, IV, VA and VC Vehicles. An air dryer, hoses to and from the compressor, intake hose(s) and stowage tanks shall be required as a minimum for use with the air compressor.

3.11.10.4.2 Mission VB Vehicles. The brake system air compressor shall be 30 CFM minimum capacity on all vehicles. An air dryer, aftercooler, oil coalescing filter, hoses to and from the compressor, intake hose(s) and stowage tanks shall be required as a minimum for use with the air compressor.

3.11.10.5 Traction Control. The vehicle shall be equipped with a traction control system. This system, under conditions of varying traction, shall be capable of shifting power to the tire(s) with the highest degree of traction, such that the tractive effort is maintained to the maximum extent possible.

3.11.10.5.1 Antilock Braking System (ABS) (objective). A multi-channel Antilock Braking System shall be installed on all variants that meets the requirements for brake performance specified within FMVSS 571.121 regulation. ABS shall be activated while the CTIS is in the “Highway” mode and deactivated in all other modes of CTIS operation for Mission VB Vehicles. Mission I, II, III, IV, VA and VC Vehicles shall have an operator-controlled switch that activates the ABS for highway use and deactivates it for off-road operations. Deactivating the ABS shall not deactivate traction control system. The system shall have built in test for troubleshooting and dash mounted error indication lights. The diagnostic information shall display system error either on board, by use of a Soldier Portable On-system Repair Tool (SPORT), or acquisition by way of the SAE J1587/J1939 data bus for use with the contract test set.

3.11.10.6 Brake wear indicator (objective). Equip the variants with pointer system to quickly determine the brake pad's remaining life.

3.11.11 Towing and tiedown provisions.

3.11.11.1 Towing eyes. Two towing eyes shall be installed on both the front and rear of the vehicle and at the rear of the and LHST. The LHST shall be recoverable with full payload from the rear. Each towing eye and its mounting shall withstand a load of at least 60,000 pounds without failure or permanent deformation when the load is applied at an angle up to 45 degrees from the longitudinal axis. The towing eyes shall be of a size such that the vehicle can be towed with the heavy-duty towbar described on dwg 12322663. Towing shackles shall be provided with the towing eyes. Front tow eyes shall be located in the vertical plane of the frame side rails.

3.11.11.2 Pintle (objective). A pintle shall be provided which permits a single operator to hook-up to an M1076 PLS trailer or LHST without the need for exact truck-trailer alignment (threshold), with only one mount/dismount by the operator. Hook-up shall be with the trailer tongue offset laterally up to 12 to 18 inches from the centerline of the truck and 12 to 18 inches aft of the towing position. The pintle shall be capable of towing all pintle style trailers in common use with 2 ½, 5, and l0 ton vehicles (M105, M1061, M1073, M989). This pintle is not required for Remanufactured vehicles.

3.11.11.2.1 Pintle for Mission I, II, III and IV Vehicles (threshold). A towing pintle at the rear of the vehicle shall be furnished. The pintle assembly shall be of the swivel type and conform to the size and strength described on dwg 8710630. The assembly shall be furnished with mounting flanges and lubrication fitting. The pintle assembly mounting surface shall be forward but not more than 4 inches forward of the rear most part of the vehicle. The mounting of the pintle assembly shall include reinforcements to transfer pintle loads directly to the web of the chassis frame. Provision for attachment of trailer safety chains shall be provided as per SAE J849 (per truck installation note) for single axle trailers to be compatible with the M989 trailer which requires a one inch safety chain bracket pin.

Pintle height shall be 35 inches +/-3 inches from the ground with truck loaded to its rated cargo capacity. Pintle height shall be appropriate to accommodate the following trailers with towbar height inches as listed: M105 (34-1/4), M149 (30 to 41), M332 (33-3/8), HEMAT (32-1/2 to 40).

3.11.11.2.2 Pintle for Mission V Vehicles (threshold). The self guiding tow pintle assembly, that mates 3 inch ID Lunette Rings, shall be furnished not more than 4 inches (102 mm) forward of the rearmost part of the truck (excluding FR). The assembly shall be furnished with mounting flanges and lubrication fitting. The assembly shall be positioned to accommodate the lunette height of the PLST. Provisions for attachment of trailer safety chains shall be in accordance with SAE J849 (per truck installation note).

3.11.12 Cab. The cab shall have cab crush protection that provides survivable space for the occupants as described in FMVSS 571.208 for occupant crash protection and roll over situations (objective). Operator shall have visibility of the ground when negotiating terrain at

maximum breakover angles. Cab shall be protected from terrain and natural obstacles while travelling cross-country.

3.11.12.1 Seating. The cab shall have seating provisions for a minimum of two crewmembers. Seats shall be individually adjustable fore and aft and to the occupant's height. The design shall provide leg, back and shoulder support (threshold) (objective – head support).

3.11.12.2 Windshield and windows. Windshields and windows shall be configured to minimize solar glare. Visors or other means shall be used to preclude performance degradation due to glare from external sources such as sunlight or headlights. Full frontal and side glare or shade protection shall be provided to all vehicle occupants (objective). However, windshields or other transparent areas through which high acuity vision is required shall not be impaired. Visors shall also be capable of telescoping to provide coverage across the entire width of the windshield and folding toward the vehicle's body sides to fully protect the occupants from side glare (objective). Visors shall have a mechanical detent to prevent movement while in the stowed position.

3.11.12.3 Windshield wipers and washers. The cab shall be equipped with multi-speed windshield wipers and windshield washing system. A 3-qt (2.8 l) washer reservoir compatible with cleaner and appropriate additives for the climatic conditions for destination shall be furnished. Windshield wipers and washers shall conform to FMVSS 571.104 and SAE J198.

3.11.12.4 Vehicle cab interior. The vehicle cab interior and upholstery color shall be either black, dark green, or dark brown. If the vehicle exterior is tan, then the interior shall be either black or tan. The cab undercarriage and doghouse shall be insulated to reduce engine noise and the transmission. Interior foam shall be a minimum of two inches thick (objective). A first aid kit (reference drawing 11677011 for guidance) and a #10 BC fire extinguisher IAW FMCSR 393.95 shall be mounted within the cab interior (objective – first aid kit mounted in the cab) and shall be detachable to allow removal from the cab.

3.11.12.5 Cab floor drains. The cab floor shall be provided with floor drains to permit draining of freestanding water on the cab floor. Removable plugs shall be provided for sealing of each hole. The plugs shall be captively restrained to the cab floor with a tether.

3.11.12.6 Chemical protective equipment storage (threshold - Mission VB Vehicles; objective - Mission I, II, III, IV, VA and VC Vehicles). Space shall be provided inside the cab for the following: NBC garment suit, two per crewmember; NBC mask, one per crewmember; NBC gloves, two pair per crewmember; NBC overboots, one pair per crewmember; NBC hood, one per crewmember. The specified protective clothing shall be restrained by a quick disconnect type device to prevent unseating when traveling over rough terrain and when only a portion of the garments are being utilized.

3.11.12.7 M4/M16 rifle mounting..

3.11.12.7.1 Mission I, II, III, IV, VA and VC Vehicles (threshold). This kit will provide

the necessary hardware for the mounting of two government-furnished rifle mounting kits inside the cab, one on each door. The kits shall consist of the items found on drawing 5705590. Holes will be provided for attachment of all items to the doors and will be filled with threaded fasteners.

3.11.12.7.2 Mission VB Vehicles (threshold). The truck shall be provided with two rifle mount kits each consisting of Bracket, Mounting, Catch Assembly 11630581 Rack, Storage, Small Arms 11630529; Support, Rifle Mounting 11630594 with brackets and hardware required for installation to hold an M16A2 Rifle with blank adapters one for the operator and one for the passenger and shall be easily accessible.

3.11.12.8 Cab temperature control.

3.11.12.8.1 Heater and defroster. The vehicle shall come equipped with a heater, blower and defroster. The heater shall be capable of raising the cab temperature from -25 to +41 degrees F (-32 to +5 degrees C) within 45 minutes after the vehicle has been started. The blower shall be operable independent of the heater. Windshield defrosting and defogging system shall conform to SAE J382, Area "A" at ambient temperatures of down to -50 degrees F (-46 degrees C) within 1 hour when ~~and~~ tested in accordance with SAE J381.

3.11.12.8.2 Cab cooling. An in-dash cab ventilator shall be installed that allows the occupants to direct the flow of air (threshold – Mission VB Vehicles; objective – Mission I, II, III, IV, VA and VC Vehicles).

3.11.12.9 Rear view mirrors. Mirrors conforming to A-A-52432 shall be provided on the left and right hand sides, be capable of folding toward the body sides in at least one direction, and prevent vibration during operations.

3.11.13 Vehicle security. Shall have a means to provide vehicle security (i.e., locking hatches, bulk fuel tanks, module doors, steering lock bracket) (objective – padlock-type door locks).

3.11.14 Stowage. Stowage space with latching device to utilize a standard military padlock shall be provided to accommodate Basic Issue Items (BII), publications (operator, hand receipt and warranty) and operator's Common Table of Allowances (CTA) 50-900 personal clothing and equipment (objective). All stowage boxes shall contain drain holes. Publications shall be stowed inside of the cab above the fording line. Provisions shall be included that prevent contents of BII from resting on the bottom of the box without obstruction of the drain holes (objective).

3.11.15 Reserve.

3.11.16 Controls and control cables. Identifying symbols for controls and operating mechanisms shall be in accordance with FMVSS 571.101 and 571.102. All control cables shall be of the low friction type protected at both ends with adequate seals to prevent entry of moisture

and contamination into the support tube and to provide a bearing surface for smooth motion of the end rod.

3.11.17 Rear reflective signature. Exterior safety markings meeting the intent of the requirements of FMVSS 571.108, section 5.7, shall be applied on the rear of Mission IV Vehicles (threshold) (objective – Mission I, II, III, VA, VB, VC and VI Vehicles). Marking system shall be designed for ease of removal/reattachment and storage requirements for repeated use (objective).

3.11.18 Collision warning system (objective). A collision warning system shall be installed on the vehicle that shall provide the driver a visual/audible indication when objects are too close to the vehicle. The central processing unit shall be able to compute closing speeds from 0.25 to 100 mph (minimum). The front antenna transmitter/receiver shall have a range of 1 to 350 feet (minimum). Side blind spot and indicator shall be provided to right hand side for blind spot detection. Driver interface unit shall warn driver both visually with LED indicators and audibly with tones for approaching, potential hazardous situations. Components shall be constructed for external mounting and operate in the environmental conditions of the vehicle. Vehicle operator shall be able to turn the entire system on and off. Blackout controls for the Collision Warning System shall permit all of the indicator lights to be shut off during blackout situations. The audible alarm shall be controlled by the volume knob on the dash display unit.

3.11.19 Kits. The vehicle shall be capable of accepting all kits as specified herein. Each kit, shall not take longer than 4 man-hours to install by the MOS's as specified in 3.2.3. Holes shall be provided for the attachment of all kits and shall be filled with threaded fasteners or plugs. When specified the following kits shall be provided.

3.11.19.1 Engine arctic kit. The contractor shall provide an engine arctic kit that allows the vehicle to be started within 45 minutes, and operated within 15 minutes after starting, at temperatures down to -50 degrees F (-46 degrees C).

3.11.19.2 Reserved.

3.11.19.3 Machine gun mounting interface kit. The machine gun ring mount kit shall include M66 ring mount (reference dwg 7012810 for guidance). The kit shall be located over the cab, at the passenger's position and include provisions for operating at the passenger’s seat. The kit shall function with the M60, M2 and MK-246 machine guns and shall provide a continuous 360 degrees of traverse. The machine gun kit shall contain a cover, which shall prevent personnel from accidentally falling through the hole. The cover shall be solid in color matching the vehicle color.

3.11.19.4 Cargo covering. The contractor shall design a cargo covering kit. This kit shall provide tarpaulin covering(s) for the cargo area of the vehicle conforming to MIL-PRF-20696, Type I, Class 2. Such covering(s) shall be totally detachable from the vehicle, along with necessary supports. The overall height of the vehicle (with bows and tarps installed) shall be no more than 11 feet 11 inches in the cargo portions of the Mission I Vehicle. The cargo color

covering shall be specified in the contract and shall have the infrared reflectance properties of the vehicle paint.

3.11.19.5 Gas particulate filter unit (GPFU) interface kit

3.11.19.5.1 Mission I, II, III, IV, VA and VC Vehicles. This kit shall provide the necessary hardware and power hook-up provisions for the mounting of an M2A2 filter unit and two M3 air heater units in cab of the vehicle.

3.11.19.5.2 Mission VB Vehicles. A Gas Particulate Filter Unit (GPFU) kit shall be available. The kit shall provide the necessary hardware and power hook-up provisions for the mounting of an M2A2 GPFU and 1-M3 air heater for each crew position within the cab. The location of the M3 air heaters shall allow easy access for the respective crewmembers.

3.11.19.6 Chemical alarm interface kit.

3.11.19.6.1 Mission I, II, III, IV, VA and VC Vehicles. Configure and install an M-8 Chemical Alarm Unit in the vehicle cab using the components provided as Government Furnished Property. The detector unit will be installed in an M182 low profile mount on the interior of the cab. As necessary, design and provide any components which are required to complete successful interface of M-8 unit into the vehicles. Provide installation drawings plus component drawings and parts lists for all components of the M-8/vehicle interface. The contractor will design, fabricate, and install the electrical cable to supply vehicle power (28+/-8 VDC) to the M182 mount for operation of the detector unit. The contractor will make provisions to incorporate the M42 alarm unit as well as the M256 Chemical Agent Detector Kit in the cab as a stowable item. Drill holes as required to mount equipment allowing for installation of grommets in the holes for passage of required power cables. Mounting holes will be drilled and plugged to accommodate installation of units in the field by the user. An installation drawing will be provided to insure correct installation by the user.

3.11.19.6.2 Mission VB Vehicles. The chemical alarm kit shall consist of an M43Al Detector and an M42 alarm. The detector shall be mounted external to the cab and shall be mounted in it's upright position. The alarm shall be mounted on the interior of the cab. Detailed information on mounting bracket dimensions/hole location, detector size and electrical connections are provided on drawing D5-15-8779. This kit shall be capable of being installed within 10 minutes by the crew using only onboard tools.

3.11.19.7 Decontamination apparatus interface kit. This interface kit shall provide the necessary hardware for mounting and supporting a Ml3 Decontamination Apparatus Portable (DAP) (reference NSN 4230-01-133-4124). The DAP shall be mounted in a location accessible from the ground in its upright position using attaching bracket A-A-52513.

3.11.19.8 Universal Power Interface Kit (UPIK). Mission VB Vehicles (threshold), Mission VA and VC Vehicles (objective), shall have a UPIK available for providing hydraulic, electric and pneumatic power to FR mounted equipment when loaded onto the vehicle. The

connections shall be quick-disconnect. The vehicle mounted connections to the FR-mounted equipment shall be located in the vicinity of the left front corner of the FR in a location accessible by a soldier on the ground and protected from the build up of mud/dirt and splashing of water. The cab interior electrical connections shall be mounted in the vicinity of a suitable mounting surface for a magnetic mount control box with an 18-inch pigtail electrical harness. The minimum power available shall be as follows: Hydraulic – 30 gallons per minute at 3000 psi; Electric – 25 Amps at 12 volt and 25 Amps at 24 volt; and Pneumatic-20 cubic feet per minute at 120 psi. The hydraulic supply shall be controlled through the hydraulic selector switch. Interlocks shall be incorporated to prevent LHS operation while the UPIK is connected.

3.11.19.9 Crew compartment protection kit (objective). A crew compartment protection kit shall be developed that meets the requirements described in Appendix B. The vehicle when fielded shall have built in provisions for accepting all or portions of the kit depending on the operational need and threat.

3.11.19.10 Self-recovery winch kit (objective for all vehicles). The winch shall be mounted in a location on the vehicle that is easily accessible by a soldier when the vehicle is mired to at least the axle depth. The self-recovery device shall be capable of recovering the vehicle at GVW when mired to fender or deeper depth from either the front or rear.

3.11.19.10.1 Mission I, II, III, IV, VA and VC Vehicles (threshold). When specified, the vehicle shall be equipped with a winch for self recovery, for both forward and rearward deployment. The winch shall be driven by a hydraulic motor mounted directly on the winch. The winch installation shall not decrease vehicle approach or departure angles or the ground clearance of the vehicle. The winch shall provide a minimum line pull of 20,000 lbs from a bare drum with a minimum line speed of 15 ft/min from a bare drum. The winch cable shall be at least 200 feet in length, with a safety factor of 50% above maximum line pull capacity. A pressure relief valve shall be provided to limit winch overloading to 110% maximum line pull. End of wire rope will be equipped with clevis end. Roller or sheave assemblies shall be located at the front and rear of the vehicle to guide the cable. Winch shall be controllable from the driver's position. All controls shall be of the dead man type that will revert to neutral when released. A snatch block shall be provided with this truck to permit using a two part line. Means of securing the snatch block to a tree shall be provided. Stowage provisions for this hardware shall be provided. The winch design shall be in compliance with SAE J706. The maximum continuous rating shall be such that 2 (two) successive 100 ft line pulls can be accomplished at 90 percent of maximum torque necessary to exert a 20,000 lb line pull on bottom layer of cable without exceeding a lube oil temperature of 250^{o} F or damaging the safety brake at 120^{o} F ambient. A tension mechanism to assist in level rewind shall be provided.

3.11.19.10.2 Mission VB Vehicles (threshold). When specified the vehicle shall be equipped with a winch for self-recovery capable of forward and rearward deployment. The vehicle shall be configured to accept the winch kit as described herein, with all controls, electrical, hydraulic and mechanical linkages as required. The winch installation shall not decrease vehicle approach or departure angles or the ground clearance of the vehicle. The winch shall be provided with free spooling capability. Free spooling capability shall be controllable at

the winch only. The winch shall be equipped with holding brake and counter-balance valve to safely deploy and hold the full rated load of the winch. Winch brake shall be automatic and shall be fully engaged anytime the winch is stopped or not in use and shall be fully released during operation. The winch shall provide a minimum line pull of 20,000 lbs from a bare drum with a minimum line speed of 15 ft/min from a bare drum. The winch cable shall be at least 200 feet (61M) long with a safety factor of at least 100% above the maximum line pull capacity. A device shall be provided to limit winch overloading to 110% of maximum line pull. End of the cable shall be equipped with a clevis end. Roller assemblies shall be provided to guide the cable. Winch shall be controllable from the driver's position and at the winch itself. All controls shall be of the dead man type that shall revert to neutral when released. The winch design shall be in compliance with SAE-J706.

3.11.19.11 Extended drawbar kit. An extended drawbar kit shall be available to preclude interference between the truck and trailer such as during cross-country operation.

3.11.19.12 Bridging light bar kit. A bridging light bar kit shall be available which mounts to Mission VI Vehicles to provide stopping/hazard lights during bridging operations.

3.11.20 Additional provisions. Vehicle shall have space and power allocation for any combination of the following:

3.11.20.1 Asset tracking system (MTS and FBCB2) (objective).

3.11.20.1.1 Movement Tracking System (MTS). A system which will allow the Government to track its assets worldwide. Installation/conceptual drawings for the MTS are as follows:

EPO103-6	Arrangement Drawing For PLS & HEMTT
EPO120-05	PGI HHC-133 Computer Mount Concept
EPO120-10	Arrangement, MTS Battery Box (FMTV, PLS, HEMTT, 900 Series)
EPO120-12	Arrangement, MTS Control Panel (FMTV, PLS, HEMTT & 900 Series)
EPO120-13	Antenna/Modem Mount Concept for the PLS/HEMTT, FMTV & HETS Vehicles
865988	Installation Drawing, HEMTT & PLS

3.11.20.1.2 Force XXI Battle Command Brigade and Below (FBCB2). An FM radio based digital messaging and vehicle tracking device.

3.11.20.2 Driver's Vision Enhancer (DVE) Connections (objective). The cab shall be configured to accept a standardized Driver's Vision Enhancer (DVE), which will help drivers safely operate the vehicle at night and in otherwise obscured driving conditions. This shall include creating a dedicated space and mounting provisions, and providing hard-wired power provisions for the DVE hardware.

3.11.20.3 Automatic asset identification (objective). A Radio Frequency Automatic Identification Technology (RF AIT) device, or alternative device(s), which permits movement, material, or other management of wheeled vehicles, containers, and FR.

3.11.20.4 Identifying Friend or Foe (IFF) devices (objective).

3.11.20.5 Self-defense (objective). Shall be equipped with standard available mounts for self-defense weapons such as the M2 and M60 machineguns and the Mk-19 grenade machine gun that will allow a maximum field of fire.

3.12 Mission vehicle types.

3.12.1 Mission IA Vehicle Type – Light Cargo.

3.12.1.1. Cargo Body. The cargo vehicle shall be able to support eight std 40 x 48 inch pallets one tier high (4-1/2 feet) with load clearance of 42 x 54 inches (i.e., not less than 90" x 216"). The cargo body shall have sides, front, and tailgate with a minimum of 23 inches height above the loading surface. The sides shall be hinged to permit ease of loading and unloading and the sides and tailgate shall be removable without tools. The removable components shall have recesses or specific handles to facilitate removal. Storage space will be provided on unloaded vehicle for dropsides and posts when not in use. Cargo body inboard bed dimensions between dropsides shall be as large as possible but no less than 90 x 216 inches. Cargo covering tiedowns are required. Cargo vehicle shall also be able to support two 4500 lb pallets in rear most location of cargo bed. These pallets are 54" high, 44" wide, 55" long.

3.12.1.1.1 Cargo tiedowns. The cargo carrier shall have suitable cargo tiedowns to safely secure pallets and other payloads during all modes of operation in accordance with MIL-STD-209E (threshold) (objective- MIL-STD-209). Tiedowns shall be required at two foot (+/-4") intervals in each side of cargo bed. A minimum of two tiedowns shall also be required at front and rear of cargo bed. There shall be no holes in cargo bed; however, each tiedown bracket depression will have a 1/4" hole to permit drainage of water. The cargo bed shall be equipped with 4 large cargo tiedown provisions that meet the requirements of MIL-STD-209 (objective).

3.12.1.2 Material handling crane, (MHC). The vehicle shall include a crane. Crane shall be operated by controls at the side of the vehicle and a remote control. Crane design shall provide for smooth and quiet operations, ease and flexibility of operation, and versatility of performance. Crane shall comply with Federal OSHA and ASME B 30.5. A flexible/swiveling 1-foot interface between boom and hook shall be provided with each crane to facilitate attachment of load without precise positioning of the boom, if knuckle boom crane is utilized. Vertical lift of load is required. All cranes shall be fully operable without movement of any other vehicle component or assembly. The winch shall have a braking system for lowering and raising of the load. The crane winch shall not prevent the crane from folding into the stowed position to meet the requirements set forth in 3.4. All cranes shall be fully operable without movement of space tire/carrier assemblies.

3.12.1.2.1. Location and Capability. The MHC shall be mounted centrally (on or near the longitudinal center line) at the rear of the cargo bed and be capable of lifting 2,500 pounds at a minimum of 19 feet reach to allow vertical pick-up of the pallet at the outermost location of the cargo body. It shall have a minimum working traverse of 370 degrees with a static capacity of 125 percent of rated capacity at inner and outermost reach. The traverse overlap shall be centered at 90 degrees to the longitudinal centerline of the vehicle and at the same side of the vehicle as the manual control station. In addition, the crane shall be capable of lifting a 4,500 lb pallet with chain sling (NSN 3940-01-209-6008) and stow two pallets in rear most location of cargo bed. The lift must be at a minimum of 9 feet reach. The pallet dimensions are 54" high, 44" wide, 55" long.

3.12.1.2.2 Stabilizing system. The stabilizing system shall be designed to provide stable crane operation at all operating capacities and reach down slope with the empty vehicle on 5-degree lateral slope (threshold) (7-degree lateral slope – objective). The stabilizing system retracted or extended shall have zero creep for Mission I, II, III, IV, VA and VC Vehicles. The stabilizing system when extended shall have creep of not more than 0.5 inch (12.7 mm) in 30 minutes with truck and crane boom at maximum load, boom at maximum extension for Mission VB Vehicles. The stabilizing system retracted shall not interfere with the vehicle road operation. The stabilizing system shall lock in place in order to stabilize the vehicle at all times. The stabilizing system safety requirements shall be IAW with those defined in ASME B30.5. A safety switch shall be integrated with the system to preclude use of the crane unless outriggers are in place (threshold – Mission VB Vehicles; objective – Mission I, II, III, IV, VA and VC Vehicles).

3.12.1.2.3 Crane controls. The crane shall be operated by controls mounted at the side of vehicle. The valve shall consist of a main relief and individual circuit reliefs to prevent overloading of crane in inner and outer boom systems. The design shall permit operating a minimum of two functions simultaneously. Crane design shall prevent load drop due to system failure. With stabilizer engaged, boom at minimum and maximum extension positioned approximately horizontal in the most stable direction the crane shall lift a rated load and hold the rated load for 30 minutes within 3 inches. Each actuator shall be labeled for its function. Controls shall automatically revert to neutral when not in use. The crane shall provide vertical lift using one control.

3.12.1.2.4 Remote control. Remote control of the MHC shall be wireless (objective) and fully proportional in regards to line speed, slewing, telescoping of boom and elevation of boom. The remote control shall be designed that in case of failure, the manual valve can be utilized immediately. If wireless, the crane operator shall be able to operate the remote control at any location within 35 feet (10.7 M) of the crane base; otherwise, a nominal 35 ft cable shall be provided. The remote control shall not seep and performance shall not be diminished when tested in accordance with MIL-STD-810, Method 512.4, Procedure I (threshold – Mission VB Vehicles; objective – Mission I, II, III, IV, VA and VC Vehicles). The remote control shall be shock resistant IAW MIL-STD-810 Method 516.5, Procedure IV (threshold – Mission VB Vehicles; objective – Mission I, II, III, IV, VA and VC Vehicles). The remote control shall have functions to match manual control except for the mast and stabilizing system controls. Stowage shall be provided for remote controller and any accessories and designed to take shock loads.

The stowage box shall contain drain holes for the egress of water and be located above the 48 inch fording depth. Controller shall be sealed against moisture and debris.

3.12.1.2.5 Overload shutdown system. The crane shall be provided with an overload shutdown, which shall preclude structurally overloading the crane. The crane's function shall cease when the crane's capacity is exceeded, except to allow lowering of the overload.

3.12.1.2.6 Load capacity chart. Load capacity chart shall be visible from each control station.

3.12.1.2.7. Line Load Winch. The crane shall provide vertical lift using one control. The winch shall have the capacity of lowering or raising a 2,500 lb. load at speed not less than 30 ft/min; (but, with a multiparty line reduced line speed is allowed), and shall comply with ASME B30.5. If used, the crane manufacturer shall supply non-twist wire rope of sufficient length that, at a minimum, two full wraps remain on the drum when the hook is in its extreme low position with the boom in its extreme upright and extended position. Wire rope shall have a safety factor of not less than 250 percent of rated load. The hook shall have a built in swivel in order to facilitate the guidance of loads into enclosed areas. The winch shall be operated by both manual and the remote controls for the crane. The winch shall have a braking system for lowering and raising.

3.12.2 Mission I Vehicle Types – IB1 Heavy Cargo, IB2 Heavy Cargo GMT.

3.12.2.1 Cargo body. The vehicle shall have a payload capacity of 22,000 pounds (not including the pintle load). The cargo body shall be able to support four MLRS RPCs rocket pods each weighing 5400 pounds and measuring 165" x 41" x 31" high, double stacked on cargo bed having inside dimensions between the dropsides of not less than 90" x 216". A 600 lbs. allowance is assumed for miscellaneous tiedowns, straps and chains. The cargo vehicle shall be able to support eight standard 40 x 48 inch pallets one tier high (4-1/2 feet) with evenly distributed weight and load clearance of 42 x 54 inches (i.e., not less than 90" x 216") including overhang. The cargo body shall have sides, headboard, and tailgate with a minimum 23 inch height above the loading surface. The sides shall be hinged or removable to permit ease of loading and the sides and tailgate shall be removable without use of tools. Side posts and corner posts shall also be removable. The removable components shall have specific recesses or handles to facilitate their removal. Storage space shall be provided on unloaded vehicle for unused dropsides and posts. The heavy duty cargo body shall have crossmembers of sufficient strength to support the government designed MLRS pod feet retainers and tiedowns. Cargo covering tiedowns are required. The vehicle shall be capable of and certified for transporting tank, infantry, aviation and artillery battalion ammunition loads consisting of palletized rounds, projectiles, fuses, and propellant canisters.

3.12.2.1.1 Cargo tiedowns. The cargo carrier shall have suitable cargo tiedowns to safely secure pallets and other payloads during all modes of operation in accordance with MIL-STD-209E (threshold) (objective- MIL-STD-209). Tiedowns shall be required at two foot (+/-4") intervals in each side of cargo bed. A minimum of two tiedowns shall also be required at front

and rear of cargo bed. There shall be no holes in cargo bed; however, each tiedown bracket depression will have a 1/4" hole to permit drainage of water. The cargo body shall be equipped with government designed MLRS pod feet retainers and tiedowns. The cargo bed shall be equipped with 4 large cargo tiedown provisions that meet the requirements of MIL-STD-209 (objective).

3.12.2.2 Material handling crane, (MHC). Same as 3.12.1.2.

3.12.2.2.1 Location and capability. The MHC shall be capable of lifting 5400 pounds at a minimum of 16 feet from the rear of the truck to allow pickup of four PODS, singularly, from the vehicle and four PODS stacked on an attached towed trailer, with center of load 15 feet from vehicle pintle centerline and off-loading to the same side of the vehicle as stacked. It shall have a minimum working traverse of 370^{o} with a static capacity of 125 percent of rated capacity at inner and outermost reach. The traverse overlap shall be centered at 90^{o} to the longitudinal centerline of the vehicle and at the same side of the vehicle as the manual control station. In addition, the crane shall be capable of lifting a 4,500 lb pallet with chain sling (NSN 3940-01-209-6008) and stow two pallets in rear most location of cargo bed. The lift must be at a minimum of 9 feet reach. The pallet dimensions are 54" high, 44" wide, 55" long. Crane shall also be capable of on/off loading M989 and M989A1 trailer while hitched in truck pintle. For Mission IB2 Vehicles interfacing with the PATRIOT, the lift capacity shall be a minimum of 4,277 pounds with an extension of 20 feet. The MHC shall be capable of loading/unloading and positioning of ammunition pallets into the field artillery ammunition support vehicle (FAASV).

3.12.2.2.2 Stabilizing system. Same as 3.12.1.2.2.

3.12.2.2.3 Crane controls. Same as 3.12.1.2.3.

3.12.2.2.4 Remote control. Same as 3.12.1.2.4.

3.12.2.2.5 Overload shutdown system. Same as 3.12.1.2.5

3.12.2.2.6 Load capacity chart. Same as 3.12.1.2.6.

3.12.2.2.7 Line load. Same as 3.12.1.2.7

3.12.3 Mission II Vehicle Type - Tanker.

3.12.3.1 Operation. The tanker truck, under standard operating conditions with all basic equipment, shall:

a. Automatic bottom load with self-contained shut-off, by a P.T.0 driven pump unfiltered fuel, 300 gpm (1,135 lpm) minimum, see 3.12.3.5.

b. Bulk unload filtered and unfiltered fuel, 300 gpm (1,135 lpm) diesel, gasoline & jet fuel with a flow control valve. See 3.12.3.5.

c. Gravity discharge through bulk discharge port with 4" pipe and hose, unfiltered fuel.

d. Automotive fuel servicing, metered, filtered fuel, w/flow control valve.

e. Overwing aircraft fuel servicing, metered, filtered fuel, with flow control valve.

f. Aircraft closed circuit refueling, and D-1, metered, filtered fuel, 100 gpm (378 lpm) per hose.

g. Defuel nozzle tube and evacuate hoses with defueling capabilities.

h. Recirculate through all lines and hoses, D-1 Type receptacle in tank and D-1 type nozzle.

i. Meet DOT 406 and meet the requirements of NFPA-407 aircraft fuel servicing regulations where possible.

j. A means for measuring fuel in bulk shall be provided in both gallons and liters. If external, it shall be stowed outside the cab.

3.12.3.1.1 Regulations. The tank shall conform to the current California Air Resources Board (CARB) pressure and vacuum requirements (threshold), and DOT 406 (objective) (threshold – DOT 406 with the exception of meeting the requirements pertaining to (a) rear under-ride protection (b) location of front and rear gusset welds, and (c) rollover rails). Carbon steel piping shall not be permitted.

3.12.3.2 Capacity. Mission II Vehicle shall have the maximum payload compatible with the chassis capacity (2,500 gallons minimum plus 3%) and transportability constraints.

3.12.3.3 Space allocation. Mission II Vehicle shall have the capability to carry at least ten 5-gallon (18.9 liters) cans of packaged lubricants. This space shall serve as alternate storage for six 50 ft x 2 in collapsible hoses, and three "Y" fittings.

3.12.3.4 Bulk discharge port hose. A 15-foot hose shall be provided using A-A-59326/2 and A-A-59326/6 Class 1, 3-inch coupling halves and shall have a pressure rating suitable for the Tanker requirements to fit the bulk discharge port (see 3.12.3.5.5).

3.12.3.5 Fuel servicing pump.

3.12.3.5.1 Emergency valve. Fuel servicing system shall include an emergency valve assembly, which provides the means whereby fuel is not permitted to flow into the plumbing. The control for the emergency valve shall automatically be closed when the compartment door is shut. The emergency valve shall be remotely opened/closed from a point allowing the operator access to the fuel servicing controls. The control shall contain a fusible section causing the valve

to close in case of fire. The control shall be positioned on the extreme exterior of the vehicles to allow the operator accessibility during an emergency.

3.12.3.5.2 Metering. Fuel servicing shall include a meter, which provides the capability of metering filtered fuel flow from any fuel dispensing hose reel. The flow meter shall be able to simultaneously measure all fuel servicing lines.

3.12.3.5.3 Bottom Loading. Fuel servicing system shall include an automatic bottom loading method capable of accepting 600 gpm (2,271 lpm) from an external pumping source utilizing a D-1 type receptacle. The automatic bottom loading apparatus shall be adjusted to automatically shut off flow of fuel when the fuel in the tank reaches within 25 gallons of capacity.

3.12.3.5.4 Connectors. Fuel servicing system shall include all necessary couplers, adapters, and reducers to insure interoperability with existing fuel dispensing equipment systems and vehicle (i.e., HEMTT Tanker Aircraft Refueling System (HTARS), Fuel Systems Supply Point (FSSP), Forward Area Refueling Equipment (FARE) System, M49 Series 1,200 gallon tankers, M131 series 5,000 gallon semitrailer tankers, and tank and pumping units to include the Tank and Pump Units (T&PU) (objective), FMTV tanker (objective), and M967, M969, M1062 tankers (objective)).

3.12.3.5.5 Hoses and reels. Fuel servicing system shall include a minimum of two (objective – four) 50-foot fuel dispensing hoses on hose reels. Hose ends shall be male quick disconnect. Hoses shall comply with API STD 1529 Grade 1, Type C, 150 psi working pressure, except for static wire requirements. Two static grounding reels with 40 ft grounding cables and a ten foot long Y branch at the end, with alligator type end connections on the end of each branch, shall be provided. A ball stop shall be added to the deadman hose and static grounding reels to prevent damage to components and deadman handle during reel recoil.

3.12.3.5.6 Nozzles. Two open port automotive refueling nozzles (NSN 4930-01-318-6091), and equipped with swivel fittings and female quick disconnect are required. Fuel servicing system shall be equipped and have the capability of utilizing two open port nozzles each with spouts for aircraft servicing and motor vehicle servicing (leaded and unleaded fuel) and the closed-circuit refueling nozzles and "D-1" center point. The nozzles shall be quipped with female quick disconnects and be compatible with fuel receiving ports in all fuel consuming equipment or containers. Provisions shall be made to secure the automotive refueling nozzles in the pump module when the nozzles are stored on the fuel dispensing hoses. Open port nozzles less than 1-1/8 inch shall be available as Common Table of Allowances (CTA) items.

3.12.3.5.7 Filter separator. The fuel servicing system shall include a filter/separator assembly, which meets the performance requirements of API SPEC 1581, group II, class B (threshold), MIL-PRF-52308 (objective).

3.12.3.5.8 Sampling probe. The vehicle at a minimum shall be equipped with a sampling probe (NSN 4730-01-155-5773) on the discharge side of the filter/separator for use with the

aqua-glow water test kit (NSN 6640-00-244-9478).

3.12.3.5.9 Alternate back-up fuel delivery. An alternate fuel delivery means capable of delivering a minimum of 25 gpm (95 lpm) shall be included.

3.12.3.5.10 Tank fuel level indicator. The tank shall be equipped with a device to visibly determine tank fuel level from operator ground level position (threshold) and from within the cab (objective).

3.12.3.5.11 Gages. The bezels of the discharge line pressure gage, venturi nozzle pressure gage, and differential pressure gage shall be positively attached (as opposed to press-fitted) to the gage casing. The differential pressure gage shall have sufficient sensitivity to indicate a positive reading when the tanker filter separator (see 3.12.3.5.7) is installed with new/clean filter elements. Lenses must be compatible with all fuels utilized by the Tanker. If analog gauges are used, they shall be dampened.

3.12.3.5.12 Pump module locking provisions. A single locking device shall be provided to secure the pumping module. Locking of the module door(s) shall be accomplished by using padlocks (NSN 5340-00-158-3805).

3.12.3.6 Fire extinguisher. The tanker truck shall be equipped with two dry chemical extinguishers with a 20 BC rating mounted on the exterior of the truck. Mountings shall be installed so that the extinguishers are easily accessible to the operator.

3.12.3.7 System drain. A convenient drain shall be provided to allow excess fuel to be completely drained from undertank and distribution module piping to permit safe maintenance procedures.

3.12.3.8 Tanker Access Ladder. Access to the top of the tank shall be provided while maintaining a minimum of 3 points of physical contact.

3.12.3.9 Reserve.

3.12.4 Mission III Vehicle Type - Wrecker.

3.12.4.1 Recovery and retrieval (towing and lift/towing). The vehicle shall have the following capabilities:

3.12.4.1.1 Recovery. To affect recovery/evacuation of all U.S. Army wheeled vehicles with a two soldier crew (Threshold), one soldier (Objective) through the use of tools and onboard equipment (i.e., tow bar, chock blocks, ground anchors, pulley, winches, etc.).

3.12.4.1.2 Retrieval. Hook-up, lifting and towing from the front or rear all towed vehicles loaded to their respective capacities, without trailer or towed loads; and hook-up, lifting and towing up to the GCW rating and axle ratings of the Wrecker from the front or rear of the other

vehicles, with their associated trailers in accordance with 3.12.4.1.1. Mission III Vehicles shall lift and tow vehicles with the wheels of these towed vehicles off the ground at the lifted end. Rear lifting of the M917, M918 and M919 and front/rear lifting of the FMTV are excluded. The vehicle shall be capable of lifting and towing and flat towing all wheeled vehicles and trailers at a GCW of no greater than 100,000 lbs. on relatively level hard surface roads at speeds up to 15 mph for a duration of 50 miles. The vehicle shall be capable of lifting and towing all wheeled vehicles and trailers at a GCW of no greater than 60,000 lbs. over the Mission III Vehicle Operational Mode Summary/Mission Profile (OMS/MP).

3.12.4.1.3 Retrieval system. The vehicle shall have a retrieval system to take the pull force necessary to lift and tow the specified vehicles.

3.12.4.1.4 Recovery angles. Recovery of loaded vehicles with the recovery winch cable deployed at a sideward angle of up to 32^{o} from the longitudinal centerline and at a downward angle of up to 23^{o} from the vehicle longitudinal, horizontal centerline.

3.12.4.1.5 Retrieval height. Maximum height of the Wrecker in the retrieval (lift and towing) mode shall be no greater than 143 inches.

3.12.4.1.6 Chock provisions. Provisions for attachment of ground chocks (spades) at rear of vehicle, both in the longitudinal and transverse direction.

3.12.4.2 Maintenance and crane assistance. The vehicle shall have the following capabilities up to the weight, reach, and hook height requirements of the crane as specified in 3.12.4.3.

3.12.4.2.1 Power pack removal and installation. Removal and installation of power packs from all wheeled vehicles and all variants of the following tracked vehicles: M88, M1, M109, M60, M2 and M3.

3.12.4.2.2 Power pack transport. Lift above power packs from vehicle, drive away and place on ground and also place on stake and platform trailers (i.e., M127, M872, M871) or cargo trucks (i.e., those cargo trucks listed under 3.12.4.1.1).

3.12.4.2.3 Gun tube and mount removal and installation. Remove and install gun tubes and gun mounts from all variants of the following tracked vehicles: M1, M2, M3, M60 and M109.

3.12.4.3 Material handling crane (MHC). Same as 3.12.1.2.

3.12.4.3.1 Location and capacity. The MHC shall be capable of performing all the lifting functions specified below, as measured from the rearmost extremity of the vehicle. It shall have a minimum working traverse of 370^{o} with a static capacity of 125 percent of rated capacity at outermost reach. The traverse overlap shall be centered toward the front of the vehicle.

a. Lift 7,500 lbs at 11 ft, with bottom of lift hook located no less than 14 feet from ground (without boom supports).

b. Lift 10,000 lbs at 8 ft, with bottom of lift hook located no less than 14 feet from ground (without boom supports).

c. Lift 13,500 lbs at 5 ft, with bottom of lift hook located no less than 14 feet from ground (without boom supports).

d. Lift 5,400 lbs at 14 ft, with bottom of lift hook located no less than 11 feet from ground (without boom supports).

3.12.4.4 Stabilizing system. Same as 3.12.1.2.2.

3.12.4.5 Crane controls. Same as 3.12.1.2.3.

3.12.4.6 Crane remote control. Same as 3.12.1.2.4.

3.12.4.7 Overload shutdown system. Same as 3.12.1.2.5.

3.12.4.8 Load capacity chart. Same as 3.12.1.2.6.

3.12.4.9 Self-recovery winch. Same as 3.11.19.10, except only forward deployment is required and a front mounted winch is permissible and the angle of approach (specified in 3.5.5.a) may not be less than 31^{o}.

3.12.4.10 Heavy duty recovery winch. The winch design shall be in compliance with SAE J706. The system shall be composed of one winch with a bottom layer rating of 60,000 lbs. The rating shall be established on the basis of cable deployment horizontally rearward on the longitudinal centerline of the vehicle. The winch shall have a minimum of two-speeds. The low speed shall not be less than 10 fpm at full load on the first layer of the winch drum. The no-load high speed shall be at least twice as fast as the low speed. Uniform level winding of the winch cable onto the winch drum is required. There shall be a minimum of 185 feet of useable wire rope in continuous length beyond the rear of the vehicle without splice joint with a safety factor of at least 50 percent above maximum line pull capacity. End of wire rope shall be equipped with clevis. The maximum continuous operational rating shall be such that two (2) full length line pulls can be accomplished in the low speed ratio at 90% maximum pull at 120^{o} F ambient without exceeding a lube temperature of 250^{o} F. The power take-off shall be of a capacity to operate the winch at full load in low speed. The winch shall be protected with a hydraulic relief valve set at 105% of pressure required for maximum line pull horizontally rearward on the longitudinal centerline of the vehicle. When in the stowed position, the free end of the heavy-duty winch clevis shall not be permitted to strike or cause damage to any vehicle component. A means of securing the clevis when in the stowed position shall be provided.

3.12.4.10.1 Heavy duty recovery winch system and controls. The winch shall be operated

by controls mounted on one side of vehicle and also by a remote control unit with a nominal cable lenght of 35 feet (threshold). The winch operator shall be able to operate the wireless remote control at any location within a minimum of 35 feet (10.7 M) from the back of the vehicle (objective).

3.12.4.11 Reserve.

3.12.4.12 Reserve.

3.12.4.13 Anchor/spade deployment. The deployment of anchors/earth spades shall not exceed 45 minutes using 2 soldiers (Threshold), 15 minutes with one soldier (objective).

3.12.5 Mission IV Vehicle Type - Tractor.

3.12.5.1 Fifth wheel. Vehicle shall be equipped with a full oscillating, 36-inch diameter fifth wheel with forks and lock for SAE J848 3.5-inch kingpin. The fifth wheel shall be capable of being uncoupled by the operator while at the side of the fifth wheel. Uncoupling action shall be protected by a secondary manual lock, preventing uncoupling of the primary locking mechanism until the secondary lock is manually released.

3.12.5.1.1 Swing clearance. Swing clearance from centerline of kingpin to rear point of obstruction (semitrailer nose to tractor components) forward of the fifth wheel shall be adequate to accommodate trailers in 3.12.4.4, in a full articulated condition.

3.12.5.1.2 Mounting. Fifth wheel mounting shall conform to FMCSR 393.70.

3.12.5.1.3 Fifth wheel height. Loaded level height of the fifth wheel shall be 63 inches plus or minus one inch.

3.12.5.2 Maintenance platform. A self-cleaning grating of sufficient structural strength (for use while connecting air and electrical lines between tractor and semitrailer and for maintenance access to equipment mounted on the front of the semitrailer) shall be installed. Provisions to allow access to personnel climbing onto the deck plate shall be furnished. Access for maintenance of fittings and other equipment shall be furnished.

Maintenance platforms shall be capable of being walked on and of supporting two 200-pound men. Maintenance platforms shall provide access to equipment mounted on the semitrailer gooseneck, even with the tractor up to 20^{o} off the semitrailer centerline.

3.12.5.3 Hose tender and cable supports. A hose tender with dummy gladhand connectors (to retain hoses when not in use) shall be provided in a convenient location to secure the trailer air hoses and electrical cables. The specific arrangement of hardware shall be dictated by the configuration of the semitrailers specified in 3.12.5.4, and auxiliary equipment on the tractor. A retention device to secure the slave cable (3.4.2.11) to the NATO outlet receptacle shall be provided utilized during towing operations. This cable shall have adequate secured

routing along the tractor deck plate and be securely fastened to the hose tender.

3.12.5.4 Towed vehicles. The truck tractor shall operate both on- and off-road and be compatible the PATRIOT Missile Launcher Station and Radar Set on the M860 semitrailer in accordance with SAE AS8090, with exception of paragraph 3.5.1.2.1.2.2 of SAE AS8090 as it pertains to kingpin vertical location, fully loaded equipment transporter, M870 40-ton lowbed semitrailer (objective), M871 (objective) and M872 (objective).

3.12.5.5 Reserve.

3.12.5.6 External or MHC hydraulics. Same as 3.12.1.2.3

3.12.5.7 Spare trailer tire. The tractor shall provide for stowage of a single 18.00 x 22.50 tire for the M860A1 semitrailer.

3.12.5.8 NATO connectors. For PATRIOT missile system support, the tractor shall be equipped with a separate NATO STANAG 4074 type connector capable of being used to deliver 1000 watts of power at 28 volts to the missile system during road march/emplacement.

3.12.6 Mission VA, VB and VC Vehicles - Light and Heavy Load Handling Systems (LHS) and Common Bridge Transporter (CBT). The LHS variants shall meet all requirements herein while interfacing with ISO containers and FR at the payloads outlined in Table IV. The CBT LHS shall also interface with the Government furnished Bridge Adapter Pallet (BAP). The LHS shall be operated from inside the cab, with the controls readily accessible to the driver. The LHS shall be capable of completely loading/unloading a FR or container (see 3.10.1.1) by a crewmember sitting in the driver's position, without the assistance of other personnel or equipment (objective). The Light LHS and CBT vehicle shall also incorporate an interface for auxiliary LHS controls external to the cab to permit full LHS operation by an operator or maintainer standing outside the vehicle (threshold – Mission VC Vehicle; objective – Mission VA Vehicle). The cab controls for the CBT shall include a two-speed engine idle control switch readily accessible to the driver.

3.12.6.1 Lifting capability. The CBT, Light and Heavy LHS shall be capable of the following, at the payloads specified in Table IV, in the automatic mode. Payload shall include the weight of any component such as FR, Container Roll-on/Off Platform (CROP) or ISO containers/shelters, tiedown devices, sideboards, or tarpaulins.

a. Loading/unloading the FR from/to the truck a minimum of 12 inches (305 mm) below ground level, and any intermediate level (threshold – Mission VC Vehicles in the manual mode; objective – Mission VC Vehicles in the automatic mode).

b. Loading/unloading from/onto uneven ground slopes a minimum of 5 degrees threshold (10 degrees objective) from the truck’s lateral and horizontal axis.

c. Loading/unloading to/from the LHST or docks in which the height is equal to or less

than the height from the ground to the bottom of the FR (while on the truck).

d. Attaching/detaching itself to a FR from an approach angle of 20 degrees from the truck centerline and load and secure the FR to the prime mover without the assistance of other personnel or material handling equipment.

e. Be capable of self-loading, unloading, or transporting standard ISO 668, Type 1CX (4 ft. 3 in. height) to ISO 668, Type 1CC freight containers, shelters and mission modules onto both the vehicle (threshold) and the PLS trailer without use of FR (objective) (threshold – through the use of the CHU). On-vehicle-storage of necessary interface equipment is desired and shall not exceed 96 inches overall width when stowed (Objective).

f. A fully loaded CROP shall be capable of being extracted from and inserted into an ISO container using the LHS. The ISO/CROP weight shall be at the respective payloads of the Light and Heavy LHS.

g. Loading/Unloading to/from the LHST in which the height is 8.9 inches or more below the bottom of the BAP rails (while on the CBT).

3.12.6.2 Loading/unloading time. The time for loading/unloading a FR, fully loaded, to or from the truck shall not exceed 1 minute. The time for transferring a FR to or from the LHST shall not exceed 1 minute. The time shall begin when the LHS is activated, and shall end when the FR is secured to the truck. Time taken to back the vehicle up and attach to the FR shall not be considered for this requirement.

3.12.6.3 Height limitations. No portion of the LHS, A-frame FR, or the vehicle (not including the CHU), shall exceed 177.2 inches (4.5 M) when loading or unloading a FR. Mission vehicles equipped with a CHU kit are allowed to exceed 177.2 inches when loading flatracks.

3.12.6.4 CBT Bridge Bay Water Launch and Retrieval.

a. Free launch an interior bay and/or ramp bay into the water in no more than five minutes. The time shall begin when the truck has backed into the water to the required depth and the parking brake is set, and shall end when the bridge bay is floating free of the vehicle. For free launch, the shore slope shall not be more than 20 percent. With a 10 percent slope, the interior bay requires a water depth of at least 36 inches; and, the ramp bay requires a water depth of at least 44 inches.

b. Controlled launch of an interior bay and/or ramp bay into the water in no more than five minutes. The time shall begin when the truck has backed into the water to the required depth and the parking brake is set, and shall end when the bridge bay is floating free of the vehicle. For a controlled launch, the shore slope shall be no more than 10 percent. With a 10 percent slope, the interior bay requires a water depth of at least 42 inches and the ramp bay requires a water depth of at least 50 inches. During this operation, the BAP winch frame is attached to the LHS

hookarm to crane the bay into the water.

c. High bank launch of an interior bay and/or ramp bay into the water from a vertical slope with a maximum bank height of 28 feet. For a high bank launch, the shore slope shall not exceed 20 percent. On shore slopes greater than 10 percent, the front end of the vehicle shall be anchored. Minimum water depth at the launch site shall be 30 inches. The bridge bay shall be high bank launched in the transport (i.e. folded) condition with all travel latches secured. Bridge bay lifting slings are a part of the ribbon bridges supplementary set.

d. Retrieve and fold interior bay and/or ramp bay from the water in not more than ten minutes. The time shall begin when the bridge bay is hooked to the BAP winch cable and the bridge erection boat is free from the bridge bay. The time shall end when the bridge bay is secured for transport and ready to exit the launch area. The shore slope shall not exceed 20 percent .

3.12.6.5 FR/container/BAP locking. The LHS shall automatically guide, center, and secure a FR/container/BAP to the vehicle such that during rough trail operations as described within the mission profile (Tables VI and VII), the FR/container remains secure. There shall be a means to manually "unload" the FR/container from the vehicle in the event of a hydraulic system or control failure within 15 minutes.

3.12.6.6 LHS overload.

3.12.6.6.1 LHS overload (threshold). The LHS overload protection system shall protect the CBT, Light and Heavy LHS, truck, and FR from permanent damage or deformation while loading/unloading uniformly distributed payloads greater than 20% for Mission VA and VC Vehicles and 27% for Mission VB Vehicles over the payloads defined by Table IV, in the automatic mode under the conditions of paragraph 3.12.6.1. There shall be an overload warning light located in the cab, in plain view of the driver. The LHS warning light shall indicate activation of the overload protection system. The CBT, Light and Heavy LHS, and trailer shall be capable of loading/unloading, in the manual mode (CBT may require opening of LHS hydraulic access cover), an overload condition of 20% for Mission VA and VC Vehicles and 27% for Mission VB Vehicles over the payloads defined by Table IV, uniformly distributed payload without permanent damage or deformation (the overload protection system may be deactivated for lift capability verification).

3.12.6.6.2 LHS overload (objective). The LHS overload protection system shall protect the CBT, Light and Heavy LHS, truck, and FR from permanent damage or deformation while loading/unloading payloads up to 10% over the threshold payloads defined by Table IV, in the automatic mode under the conditions of paragraph 3.12.6.1. There shall be an overload warning light located in the cab, in plain view of the driver. The LHS warning light shall indicate activation of the overload protection system. The CBT, Light and Heavy LHS, and trailer shall be capable of loading/unloading, in the manual mode, an overload condition of up to 20% over the payloads defined by Table IV, without permanent damage or deformation (the overload protection system may be deactivated for lift capability verification). To verify automatic mode

cutoff (i.e. the inability to lift the load), test shall be performed at a payload of 13% over the threshold payloads defined by Table IV. To verify manual mode cutoff, test shall be performed at a payload of 23% over the threshold payloads defined by Table IV.

3.12.6.7 Slave hydraulics. Self sealing quick disconnect hydraulic couplings and one hose with appropriate connectors shall be provided, such that one LHS variant can readily power the LHS of other/same LHS truck variant with each truck providing one hose. The operable CBT shall unload the loaded BAP from the inoperable CBT at both low and high idle speed. Each hose shall be at least 35 feet long (10.7 M) and stowed on the truck in a storage box. Tethered caps are required to protect the fittings. The female coupling shall be installed on the truck and the male coupling on the hose.

3.12.6.8 Hydraulic system and controls. By-passes shall be furnished where necessary to protect filters during cold temperature operation. A means shall be provided for bleeding all air trapped in the hydraulic system. A means shall be provided to release the hookarm of the LHS from the FR in the event of a hydraulic system or control failure. In the event of a system hydraulic failure during loading or unloading, a release mechanism(s) is required to safely offload the FR to the ground, or to load the FR to the truck or trailer. There shall be no leakage of hydraulic fluid past couplings or seals at maximum load and speed within the operational conditions cited herein.

3.12.6.8.1 Hydraulic system cleanliness. The hydraulic fluid cleanliness level shall conform to the following contamination limits (particles per milliliter).

Quantity (max)	Particle Size
1000	Greater than 10 microns
100	Greater than 20 microns
40	Greater than 30 microns
10	Greater than 40 microns

3.12.6.8.2 Manual operation of solenoid control valves. Vehicles shall come equipped with the capability of permitting manual operation of solenoid valves when electrical power is not available to operate the valves.

3.12.6.9 Material handling crane (MHC) for Mission VB2 Vehicles. Same as 3.12.1.2

3.12.6.9.1 Location and capability. The crane shall be mounted behind the cab in a position which shall not interfere with the LHS, and be capable of:

a. Lifting a 3900 lb (1770 kg) pallet from any location on the FR. The crane shall be capable of off-loading pallets to either side of the truck.

b. The crane shall have a lift radius minimum such that a 3900 pound (1770 kg) pallet can be loaded or unloaded from the rearmost portion of the FR. (The lift radius is that distance as measured from the crane's rotational center to the center of the lifting hook).

c. The crane shall have a minimum working traverse of 180 degrees (90 degrees minimum to each side of the trucks longitudinal axis) with a rated capacity of 125% of static capacity at inner and outermost reach.

d. The crane shall comply fully with federal OSHA safety standards.

e. The crane shall be capable of loading/unloading any pallet from any location on a fully loaded FR without rearranging other pallets or causing damage to the other pallets.

3.12.6.9.2 Stabilizing system. Same as 3.12.1.2.2

3.12.6.9.3 Crane controls. Same as 3.12.1.2.3

3.12.6.9.4 Fixed operator's station. All crane controls and indicators shall be located at the crane position, passenger side of the vehicle. The controls shall be accessible to the operator while standing on the ground. Each functional control, both crane and stabilizing system, shall be of the "deadman" type which shall automatically return to the neutral position should the operator inadvertently or intentionally release the control. All controls governing a function (rotation, boom extension and retraction, vertical lift and drop) shall be of the proportionally variable types. All controls shall be clearly marked as to the use and function. The control spacing and size shall be such that an operator wearing arctic mittens and separately NBC gloves shall be able to operate the controls. Controls shall be waterproof and performance shall not be diminished when tested in accordance with MIL-STD-810, Method 506.4 Procedure 1. In addition, controls shall be protected from weather and accidental damage.

3.12.6.9.5 Remote control. Same as 3.12.1.2.4

3.12.6.9.6 Overload shutdown system. Same as 3.12.1.2.5

3.12.6.9.7 Load capacity chart. Same as 3.12.1.2.6

3.12.6.9.8 Line load. The crane winch shall have the capacity of loading/unloading loads/pallets weighing up to 3900 lb. (1700 kg) at a 22 foot radius at a speed of not less than 30 feet/min (9 M/min) and shall comply with ASME B30.5. The crane manufacturer shall supply a minimum of 50 feet (15 M) of non-twist wire rope with a safety factor of not less than 350 percent of rated capacity of the winch. The pitch diameter of the drum or sheave(s) shall not be less than 18 times the diameter of the rope used. No less than two full wraps of rope shall be remaining on the hook line drum when the hook is in its extreme low position with the boom at maximum extension in the most upright position. The winch shall be operable by the fixed and remote controls for the crane. The winch shall have a braking system for lowering in accordance with ASME B30.5.

3.12.6.9.9 Boom angle indicator. A boom angle indicator shall be provided that is visible from both sides of the vehicle that shall indicate the boom's angle from maximum

elevation to maximum depression relative to horizontal and marked in 5 degree increments with zero degrees correlating to horizontal. The boom angle indicator shall show a direct correlation to the crane load capacity.

3.12.6.10 CBT operator's platform. The operator shall have the capability of standing on the CBT and operating the remote control unit. The operator shall have the additional capability of moving from the location directly behind the hydraulic reservoir to the location directly behind the spare tire. Walkway grating and handholds shall include sound engineering principles relating to safety and human factors engineering. The platform shall be removable such that the truck lifting provisions are accessible.

3.12.6.11 CBT pneumatic system performance. The pneumatic system shall operate from the air supply available on the vehicle and shall have quick disconnect fittings between the air supply from the vehicle chassis and the air lines to the BAP.

3.12.6.12 Reserve.

3.12.6.13 Reserve.

3.12.7 Mission VI Vehicles – Load Handling System Trailer (LHST). The LHST shall be a multi-axle trailer. The LHST shall meet all of the requirements of this specification where applicable.

3.12.7.1 Drawbar. The LHST shall be capable of being coupled/uncoupled by one person and capable of free standing on both hard and soft surfaces when fully loaded and not attached to the prime mover. The design of the LHST may require the use of a multi-position drawbar to accommodate the following situations: highway operations, off-road mobility, Multi-Role Bridging Company operations (with a kit).

3.12.7.2 Backing assist device (objective). If steerable axles are present, the LHST shall be equipped with a backing assist device which shall prevent the steerable axles of the trailer from steering once the selector in the vehicle is placed into reverse.

3.12.7.3 Stowage Box. A fully enclosed weatherproof storage box shall be provided to store any special equipment. There shall be a latch which can be secured by a standard padlock. The box shall be fully accessible when the LHST is loaded or unloaded. Storage box drain holes shall be required.

3.12.7.4 LHST equipment. The LHST shall be equipped with all items necessary to accomplish all missions. The LHST shall have mounting and stowage provisions for all equipment required to accomplish its mission.

3.12.7.5 Safety Chains. The LHST shall come equipped with rust resistant safety chains IAW SAE-J697.

3.12.7.6 Container/shelter transport (objective). The LHST shall be capable of transporting standard ISO 668, Type 1CX (4 ft. 3 in. height) to ISO 668, Type 1CC freight containers, shelters and mission modules without the use of a FR.

3.12.7.7 FR Loading. The LHST shall be capable of having a fully loaded FR, loaded and unloaded by the LHS of the truck or a vertical lift.

3.13 Extended Service Program (ESP) vehicles/components. Remanufacturing of vehicles per this specification requires the complete reconditioning of existing vehicles and the insertion of new parts and technologies which will bring them to a like-new condition. Vehicles are to be disassembled and their usable component parts are to be cleaned and/or refurbished, new parts shall be provided where specifically required and as otherwise necessary. As a minimum, performance requirements under ATPD 2304 shall be applicable to these remanufactured vehicles except as specified herein. As directed by the government, the following is the "from-to" breakdown of vehicle configurations for the remanufacture process:

Incoming chassis "from"	Outgoing vehicle "to"	
	(threshold)	(objective)
Wrecker (M984A1)	Wrecker (M984A1)	
Tanker (M978)	Tanker (M978)	Cargo (M985), LHS-Light (M1120), LHS-Light Bare (M1120 Bare), CBT (M1977)
Cargo (M985)	Cargo (M985) Tanker (M978)	LHS-Light, LHS-Light Bare (M1120 Bare), CBT (M1977)
Cargo (M977)	LHS-Light, CBT (M1977)	Cargo, Tanker, LHS-Light Bare (M1120 Bare)
Tractor (M983)	Tractor (M983)	

3.13.1 Vehicle reconditioning/assembly. Vehicle components that are not replaced with a new component shall be inspected/tested for serviceability and reconditioned, refurbished, or rebuilt using applicable Original Equipment Manufacturer's (OEM) Recommendations, Technical Manuals (TM) and Technical Bulletins (TB). OEM recommendations shall take precedence, as listed above. Form, fit, and function may only be altered if the part/component is being replaced on all remanufactured HEMTT vehicles to which the change would be applicable. All nonserviceable parts shall be replaced with those of the new production configuration.

The Contractor shall disassemble all components and sub-components. Any components specified herein for rebuild may be replaced with new to allow the vehicles to meet new production vehicle performance. All parts intended for rebuild shall be cleaned and stripped of loose/chipped paint and rust. All parts shall be thoroughly inspected. All worn or damaged parts shall be replaced. Components and sub-components shall be reassembled with new gaskets, seals, filters, strainers, fasteners, air and non-metallic hoses and electrical harnesses. Fasteners not removed as part of the reconditioning process shall not be required to be replaced. Dents, sags, waves, and bulges of sheet metal which effect the structural integrity or the function of any portion are not acceptable. Non-standard holes in any stowage boxes or in the equipment body are not acceptable and shall be plugged, patched or redrilled to standard. Stowage boxes shall be protected from moving BII. All door seals and weather stripping shall be replaced with new. All wooden components shall be replaced with new. All new sheetmetal shall be galvanized (objective). All hydraulic hoses, fittings, quick disconnects, and connectors shall be replaced with new as well as the crane winch cable. Level wind shall be included on all cranes.

All items which require lubrication as specified in TM 9-2320-279-20-1 and LO 9-2320-279-12 shall be lubricated before shipment. The vehicles will be lubricated with the same lubricants used in new HEMTTs produced in accordance with this specification.

This operation shall be performed on all subassemblies/components as summarized below:

Transfer case
Cab heater
Radiators
Propshafts
Hydraulic system
Steering and booster gears

3.13.1.1 Frame assembly. The Contractor shall overhaul the frame assembly to the extent necessary to ensure frames are corrosion free. All components shall be removed except for crossmembers, fender braces, gussets, miscellaneous clamps, brackets and related hardware, unless evidence of corrosion exists in the immediate area.

3.13.1.2 Axles and suspension. All slack adjusters shall be replaced with new automatic slack adjusters common with those used for new production HEMTTs.

3.13.1.3 Engines. The engine and all its accessories shall be disassembled. All parts are to be cleaned and inspected. The engine shall then be reconditioned to the Original Equipment Manufacturer's specifications (threshold) with the incorporation of electronic control (objective). The rebuilt engine need not meet current EPA requirements. When using other than OEM parts, the parts must be able to be repaired or replaced using the existing procedures, tools and repair parts specified in the HEMTT technical manuals. The Contractor shall not recondition cracked engine blocks or heads. Any crack is cause for disposal of the block or head. The Contractor may use serviceable parts from cracked blocks or head assemblies when repairing or rebuilding other engine assemblies.

3.13.1.4 Transmission (objective). If a manually-controlled transmission is present, it shall be replaced with an electronically controlled transmission that meets the performance requirements of this specification.

3.13.1.5 OEM installed engine accessories. The contractor shall install a new alternator and rebuilt/replacement air compressor that conforms to the new production HEMTT configuration.

3.13.1.6 Truck cab. All sheetmetal being replaced shall be galvanized. All rust is to be removed from the cab. Excessively rusted areas shall be removed and replaced with panels and/or cab body components. All unneeded holes, brackets and instruments are to be removed and/or welded up. All dents and body damage shall be repaired. The cab shall then be primed and painted inside and out. New glass and glass channels are to be installed as repaired. New glass and glass channels are to be installed as required. All glass in doors, floor, back of cab and windshield must be free of cracks. Door handles and latching mechanisms are to be repaired or replaced and new weather stripping and insulation installed. Instruments are to be tested and replaced or reinstalled, and new instrument wiring harnesses are to be installed. All upholstery shall be replaced. All new three-point passenger restraints (seat belts) shall be installed in accordance with Federal Motor Vehicle Safety Standard (FMVSS) 571.209 and FMVSS

571.210.

3.13.1.7 Steering. The column shall be reconditioned with a new steering wheel. If necessary, a new horn button, turn signal switch, and wiring shall be installed.

3.13.1.8 Fuel tanks, air tanks, reservoirs and brake system. All rust shall be removed both internally and externally. The tanks shall be assembled with new fittings. Missing fuel tank certification tags warrants tank replacement and such tanks should be treated as missing items. The fuel cap will be replaced with safety cap (fuses installed) if not already equipped. All air tanks shall be replaced with new tanks. The brake treadle valve and trailer brake valve shall be inspected, tested, and reused or replaced as necessary. The air dryer shall be rebuilt. All other brake components including the parking brake valve, trailer supply valve, relay valves, brake chambers and brake shoes shall be replaced with new components. The brake system of all vehicles post production shall be burnished sufficient for the vehicle to meet the grade holding requirements of this purchase description.

3.13.1.9 Wheels and tires. As required, wheels shall be replaced with a two piece, bolt together configuration. All tires shall be replaced with new tires.

3.13.1.10 Batteries. The Contractor shall replace all battery cables and batteries. Drainage from the battery box shall not come in contact with any other vehicle component (objective). The Contractor shall provide new batteries. The contractor shall remove all paint and corrosion from the battery box and repaint the battery box using CARC paint on the outside and acid resistant paint on the inside. A master battery cutoff switch in accordance with paragraph 3.11.3.14 shall be installed (objective).

3.13.1.11 Self-recovery winch. New wire rope shall be installed.

3.13.1.12 Lights. All lights on the vehicle shall be replaced with new. Headlights and composite lights shall be reconditioned with new bulbs and LEDs, or replaced as necessary.

3.13.1.13 Other components. The Contractor shall replace the windshield washer and wiper system with the new production configuration and replace all wiper blades. The Contractor shall check the operation of the tire carrier davit and winch and service or replace as necessary. The Contractor shall check the condition and/or the operation of the pintle hook and service or replace as necessary. All new mud flaps shall be installed. The Contractor shall replace the Cold Start Aid with new.

3.13.1.13.1 Air cleaner. The dust expulsion valve shall be replaced

3.13.1.13.2 Self recovery winch control valve If the spool is worn or damaged the entire valve shall be replaced.

3.13.1.13.3 Drag links and tie rods. Drag links (except for number 1 axle tie rods) and tie rods shall be replaced with maintenance-free drag links and tie rods.

3.13.1.14 Specific vehicle remanufacturing requirements.

3.13.1.14.1 Tanker truck.

3.13.1.14.1.1 Bulk fuel tank. Bulk fuel tank shall be replaced with new of the same configuration tank used for new production HEMTT vehicles and meet the requirements of DOT 406 (objective) (threshold – DOT 406 with the exception of meeting the requirements pertaining to (a) rear under-ride protection (b) location of front and rear gusset welds, and (c) rollover rails). Mounting springs for the bulk fuel tank shall be replaced.

3.13.1.14.1.2 Pumping module. All valves, pumps, reels, and gauges shall be disassembled and rebuilt, or replaced with new. All filters, strainers, and hoses shall be of the same configuration as that of the new production configuration.

3.13.1.14.2 Light LHS and CBT. The Light LHS and CBT shall be remanufactured from the HEMTT cargo trucks (M985 and M977) to a vehicle meeting the requirements of paragraph 3.12.6. All completed LHS variants shall be of the same configuration no matter which base overhauled chassis is used.

3.13.1.14.2.1 CBT 36,000 lb rear springs. A 36,000 pound rear spring assembly shall be used in place of the standard 32,000 pound rear spring assembly for all M1977 CBT vehicles.

3.13.2 Materials, painting, marking and corrosion. Same as 3.6.

3.14 Workmanship. Workmanship shall be of such a quality so as to assure that the vehicle and its components are free of defects that compromise, limit or reduce the capability of the vehicle system in the performance of its intended use. Bolted and riveted construction shall be secure IAW its intended use. All fuels, lubricants, and hydraulic fluids shall be provided clean and filtered IAW their intended use.

3.15 Servicing and Adjusting. Prior to acceptance of the vehicles by the Government, contractor shall service and adjust each vehicle including at least the following: Focusing of lights; adjustment of engine and transmission; adjustment of electrical and brake systems; burnishing of the brakes sufficient for the vehicle to meet the grade holding requirements of this purchase description; alignment of steering and front wheels; inflation of all tires; complete lubrication of chassis, engine, running gear, and mounted equipment with grades of lubricants required for the ambient air temperature at the delivery point; filling of windshield washer reservoir with water and appropriate additives rated to -25° F(-31° C); check of wheel lug nut torque; check of the continuity of the electrical system; and filling and charging of batteries. A minimum of 1/4 fill of fuel shall be provided in each vehicle's fuel tank.

4. VERIFICATION.

4.1 Methods of verification.

4.1.1 Test. Verification shall be accomplished through systematic operation of the end item under appropriate conditions, with or without instrumentation, and the collection, analysis, and evaluation of quantitative data.

4.1.2 Analysis. Verification shall be accomplished by technical or mathematical evaluation, mathematical models or simulations, algorithms, charts, or diagrams, and representative data.

4.1.3 Examination. Verification shall be accomplished by visual examination of the end item or it's components, reviewing descriptive documentation, certifications, and comparing characteristics to established criteria.

4.1.4 Demonstration. Verification shall be accomplished by appropriate functional checks and/or operation of the end item or it's components.

4.1.5 Certification. A document-certifying conformance to a specific requirement or standard signed by the certifying official or responsible party. When required by contract or this specification, Certifications may be used in lieu of additional verification methods and must include supporting documentation (test data, materiel analysis, etc.).

4.2 Classes of verification.

4.2.1 First Article Test. When required by contract, this test consists of a First Production Vehicle Inspection and Production Verification Test.

4.2.2 First Production Vehicle Inspection. A government inspection of the first vehicle produced under contract, usually at the place of manufacture, utilizing one or more of the verification methods referenced in paragraph. 4.1.

4.2.3 Production Verification Test. A test of the end item conducted by the government and performed at a Government test site, to establish product conformance to requirements and production capability.

4.2.4 Follow-on Production Test. A test of the end item similar to Production Verification Test, but more limited in scope, to assess continued conformance to requirements and production capability.

4.2.5 Quality Conformance Inspection. A final inspection of the end item performed before government acceptance of a production vehicle utilizing a Final Inspection Record. The Final Inspection Record is a quality record, which documents all verification actions performed on each production vehicle, both in process and final, with documented results and corrective

action.

4.2.6 Control Test. When required by contract, control tests for maintaining and evaluating process control shall be conducted by the contractor as referenced in Table V. This test is performed on selected vehicles after completion of Quality Conformance Inspection.

4.3 Verification matrix. The following table displays the verification method and classification (event) for each applicable section 3 requirement. All verifications referenced in this table may be modified at the discretion of the government by deletion or addition of items listed to assure conformance to specification and/or contractual requirements.

TABLE V - VERIFICATION MATRIX

	VERIFICATION LOCATION:
First Production Vehicle Inspection (FPVI)	Manufacturers Facility
Production Verification Test (PVT)	Government Test Site
Follow-on Production Test (FPT)	Government Test Site
Quality Conformance Inspection (QCI)	Manufacturers Facility
Control Test (CNT)	Manufacturers Facility

		VERIFICATION METHOD					VERIF. CLASS/EVENT				
SECT. 3	PARAGRAPH TITLE	CERT	ANLS	DEMO	EXAM	TEST	PVT	FPVI	FPT	QCI	CNT
3.1	COMMERCIALITY/COMMONALITY, COMPONENTS, PARTS & ACCESSORIES	X						X			
3.2	MANPOWER & PERSONNEL INTEGRATION (MANPRINT)										
3.2.1	HUMAN ENGINEERING					X			X		
3.2.2	SAFETY										
	a. Complies with FMCSR & FMVSS regulations	X						X			
	b. Free of sharp edges, projections rotating parts, hot surfaces etc, etc.				X			X		X	
	c. Type II restraints IAW FMVSS 571.209 & 210	X						X			
3.2.3	MANPOWER					X			X		
3.2.4	NOISE (OBJECTIVE)					X		X	X		
3.2.4.1	MISSION I, II, III, IV, VA AND VC VEHICLES (THRESHOLD)					X		X	X		
3.2.4.2	MISSION VB VEHICLES (THRESHOLD)					X		X	X		
3.2.5	HAND HOLDS AND STEPS				X			X		X	
3.2.6	EMISSIONS	X						X			
3.3	DIMENSIONS				X			X	X		
3.4	TRANSPORTABILITY					X			X		
3.4.1	LIFTING AND TIEDOWN PROVISIONS										
	a. Meets MIL-STD-209 requirements					X			X		
	b. Quantity and Locations				X			X		X	
3.4.2	CARGO AIRCRAFT		X						X		
3.4.2.1	MISSION II AND III VEHICLE PREPARATION					X			X		
3.4.3	RAIL					X			X		
3.4.4	MARINE		X						X		
3.4.5	HIGHWAY			X					X		
3.4.5.1	HAZARDOUS MATERIAL TRANSPORT	X						X			
3.5	FUELS & LUBRICANTS	X						X			
3.5.1	VEHICLE LUBRICATION										
	a. Maintenance Free Drag links & Tie Rods				X			X		X	
	b. Mission VB Maintenance Free Prop Shafts				X			X		X	
	c. Central Lubrication System			X				X			

		VERIFICATION METHOD					VERIF. CLASS/EVENT				
SECT. 3	PARAGRAPH TITLE	CERT	ANLS	DEMO	EXAM	TEST	PVT	FPVI	FPT	QCI	CNT
3.6	MATERIALS, PAINTING, MARKING & CORROSION										
3.6.1	MATERIAL	X						X			
3.6.2	RESERVED										
3.6.3	PAINTING										
	a. CARC Topcoat	X						X			
	b. Meet MIL-C-53072 requirements			X	X			X		X	
	c. Dry Film Thickness Check					X		X		X	
	d. Adhesion & Corrosion Test					X		X			X
	e. No reflective surfaces check				X			X		X	
3.6.3.1	CAMOUFLAGE PATTERN				X			X	X	X	
3.6.4	IDENTIFICATION AND MARKING				X			X		X	
3.6.5	DATA PLATES				X			X		X	
3.6.6.1	CORROSION CONTROL (Threshold)	X						X			
3.6.6.2	CORROSION CONTROL (Objective)	X						X			
3.6.7	MATERIAL RESISTANCE	X						X			
3.6.8	NON-SKID SURFACE				X			X		X	
3.7	ENVIRONMENTAL CONDITIONS					X			X		
3.8	INTEROPERABILITY, STANDARDIZATION & COMPATIBILITY WITH OTHER NATO COUNTRIES	X				X		X	X		
3.9	COMPONENT PROTECTION				X			X	X		
3.10	PERFORMANCE					X			X		
3.10.1	PAYLOAD					X		X	X		X
3.10.1.1	FLATRACKS (FR)					X			X		
3.10.2	TOWING A LIKE TRUCK			X					X		
3.10.3	TOWED LOAD CAPABILITY					X			X		
3.10.4	GRADE OPERATION (LONGITUDINAL SLOPE)					X			X		
3.10.5	SIDE SLOPE OPERATION					X			X		
3.10.6	SPEED					X			X		
3.10.7	GOVERNED SPEED					X			X	X	
3.10.8	RANGE					X			X		
3.10.9	VERTICAL STEP					X			X		
3.10.10	TRACKING					X			X		
3.10.10.1	BACKING					X		X	X	X	

		VERIFICATION METHOD					VERIF. CLASS/EVENT				
SECT. 3	**PARAGRAPH TITLE**	**CERT**	**ANLS**	**DEMO**	**EXAM**	**TEST**	**PVT**	**FPVI**	**FPT**	**QCI**	**CNT**
3.10.11	STEERABLE/LOCKABLE REAR AXLE			X				X	X		
3.10.12	LANE CHANGING					X		X	X		
3.10.13	TURNING REQUIREMENT					X		X	X		X
3.10.14	LATERAL STABILITY					X			X		
3.10.15	FORDING					X		X	X		X
3.10.16	APPROACH & DEPARTURE ANGLES					X		X	X		
3.10.17	BRAKING										
	a. Brake burnishing					X		X	X	X	
3.10.17.1	SERVICE BRAKES										
	a. Meets FMVSS 121	X						X			
	b. Holds on 60% grade					X		X	X		X
	c. Operation					X		X	X	X	
	d. Stopping distance					X		X			X
3.10.17.2	PARKING BRAKES										
	a. Grade requirements					X		X	X		X
	b. Indicator light					X		X		X	
3.10.17.3	EMERGENCY BRAKES					X		X	X		
3.10.18	MOBILITY		X			X			X		
3.10.18.1	MINIMUM MOBILITY RATING SPEEDS (MPH)					X			X		
3.10.18.2	MAXIMUM PERCENT NO-GO					X			X		
3.10.18.3	VEHICLE CONE INDEX (VCI)					X			X		
3.10.18.4	RIDE QUALITY					X			X		
3.10.19	RELIABILITY, MAINTAINABILITY AND DURABILITY		X						X		
3.10.19.1	RELIABILITY					X			X		
3.10.19.1.1	MISSION I, II, III, IV, VA AND VC VEHICLES					X			X		
3.10.19.1.1.1	ANCILLIARY TANKER EQUIPMENT RELIABILITY					X			X		
3.10.19.1.1.2	ANCILLIARY CARGO EQUIPMENT RELIABILITY					X			X		
3.10.19.1.1.3	ANCILLIARY WRECKER EQUIPMENT RELIABILITY					X			X		
3.10.19.1.1.4	ANCILLIARY CBT EQUIPMENT RELIABILITY					X			X		
3.10.19.1.2	MISSION VB1 AND VB2 VEHICLES					X			X		
3.10.19.1.2.1	MATERIAL HANDLING CRANE (MHC) RELIABILITY					X			X		

		VERIFICATION METHOD					VERIF. CLASS/EVENT				
SECT. 3	**PARAGRAPH TITLE**	**CERT**	**ANLS**	**DEMO**	**EXAM**	**TEST**	**PVT**	**FPVI**	**FPT**	**QCI**	**CNT**
3.10.19.2	MAINTAINABILITY					X			X		
3.10.19.2.1	MAINTENANCE RATIO (MR)					X			X		
3.10.19.2.2	PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)					X			X		
3.10.19.2.3	MISSION I, II, III, IV, VA AND VC VEHICLES			X					X		
3.10.19.2.3.1	VEHICLE MAINTAINABILITY					X			X		
3.10.19.2.3.1.1	ANCILLIARY TANKER EQUIPMENT MAINTAINABILITY					X			X		
3.10.19.2.3.1.2	ANCILLIARY CARGO EQUIPMENT MAINTAINABILITY					X			X		
3.10.19.2.3.1.3	ANCILLIARY TRACTOR EQUIPMENT MAINTAINABILITY					X			X		
3.10.19.2.3.1.4	ANCILLIARY WRECKER EQUIPMENT MAINTAINABILITY					X			X		
3.10.19.2.3.1.5	ANCILLARY CBT EQUIPMENT RELIABILITY					X			X		
3.10.19.2.4	MISSION VB VEHICLES										
3.10.19.2.4.1	VEHICLE MAINTAINABILITY					X			X		
3.10.19.2.4.1.1	MHC MAINTAINABILITY					X			X		
3.10.19.3	DURABILITY (FOR ALL MISSION TYPES)					X			X		
3.10.19.3.1	60% probability of completing 32,000 km (20,000 miles) on engine, transmission, transfer case and axles					X			X		
3.10.19.3.2	90% probability of completing 32,000 km (20,000 miles) without frame cracking					X			X		
3.10.19.3.3	CBT LHS cycle durability of 1380 launch/retrieval cycles					X			X		
3.10.20	ELECTROMAGNETIC EMISSIONS AND HIGH ALTITUDE ELECTROMAGNETIC PULSE (HAEMP										
3.10.20.1	ALL MISSION VARIANTS (OBJECTIVE)					X			X		
3.10.20.2	MISSION I, II, III, IV, VA AND VC VEHICLES (THRESHOLD)					X			X		

		VERIFICATION METHOD					VERIF. CLASS/EVENT				
SECT. 3	PARAGRAPH TITLE	CERT	ANLS	DEMO	EXAM	TEST	PVT	FPVI	FPT	QCI	CNT
3.10.20.3	MISSION VB AND VI VEHICLES (OBJECTIVE)					X			X		
3.10.21	NUCLEAR, BIOLOGICAL, AND CHEMICAL (NBC) WARFARE)	X						X			
3.11	COMPONENTS				X			X	X	X	
3.11.1	COMPONENTS AND VEHICLE RATINGS	X						X			
3.11.2.1	ENGINE COOLING SYSTEM										
	a. Meet SAE J1436 requirements	X						X			
	b. Maintain engine operating temperature					X		X	X	X	X
	c. Radiator guarded against stone & brush damage				X				X		
3.11.2.1.1	FAN CLUTCH			X				X	X		
3.11.2.2	PERMANENT OIL FILTRATION										
	a. Filter rating 10 Microns or less	X						X			
	b. Cab indicator lamp				X			X		X	
3.11.2.3	ENGINE SPEED CONTROL										
	a. Tamper resistant				X			X		X	
	b. Meet FMVSS 574.124 requirements	X						X			
3.11.2.4	AIR CLEANER										
	a. Meet MIL-PRF 62048 requirements	X						X			
	b. Air Cleaner restriction indicator				X			X	X	X	
3.11.2.5	RETARDER										
	a. Horsepower Output check	X						X			
	b. Retarder Operational check					X		X		X	X
3.11.2.6	SAMPLING VALVES				X			X		X	
3.11.2.7	VISUAL FILTER INDICATORS				X			X		X	
3.11.3	ELECTRICAL SYSTEM										
	a. Meet FMCSR 393.27 through 393.33 and MIL-STD 1275 requirements	X						X			
	b. 24 V system, 12 or 24 volt lighting system					X		X		X	
	c. On, Off, Start ignition switch				X			X			
	d. Corrosion Resistant wiring	X						X			

		VERIFICATION METHOD					VERIF. CLASS/EVENT				
SECT. 3	**PARAGRAPH TITLE**	**CERT**	**ANLS**	**DEMO**	**EXAM**	**TEST**	**PVT**	**FPVI**	**FPT**	**QCI**	**CNT**
	e. Reverse Polarity Check			X				X			
	f. Circuit Identification Check				X			X		X	
3.11.3.1	ELECTRICAL ACCESSORIES				X			X			
3.11.3.2.1	Mission I, II, III, IV VA and VC Vehicles				X			X			
3.11.3.3	LIGHTING										
	a. Meet FMVSS 571.108 requirements	X						X			
	b. Brake lights override Hazard lights					X		X	X	X	X
	c. All Light Emitting Diodes (LEDS) includes interior lights				X			X		X	X
	d. All indicators and gauges illuminated in Service Mode				X			X		X	X
3.11.3.4	HEADLIGHTS				X			X		X	X
3.11.3.5	WORK LAMPS										
	a. Minimum of 1500 candlepower	X						X			
	a. 4 inch diameter lenses				X			X		X	
	b. On/Off switches on lamps and in drivers area				X			X		X	
	c. Mission III & IV vehicles have two (2) additional demountable worklamps with a cord that can reach 20 feet beyond rear of truck				X			X		X	
3.11.3.6	CONVOY WARNING LIGHTS										
	a. Mounting provision check				X			X		X	
	b. Meet A-A-52418 requirements	X						X			
	c. Deactivation during blackout					X		X		X	
	d. 360 degree visibility				X			X	X		
3.11.3.7	SECURE LIGHTING					X		X	X		
3.11.3.8	COMMUNICATION EQUIPMENT (OBJECTIVE)				X			X		X	
3.11.3.8.1	MISSION I, II, III, IV, VA AND VC VEHICLES (THRESHOLD)				X			X		X	
3.11.3.8.2	MISSION VB VEHICLES (THRESHOLD)				X			X		X	
3.11.3.9	WIRING	X						X			
3.11.3.10	BATTERIES										
	a. Meets ATPD 2206R6 requirements	X						X			
	b. Battery location/insulation				X			X		X	
	c. Brass connections				X			X		X	

		VERIFICATION METHOD					VERIF. CLASS/EVENT				
SECT. 3	**PARAGRAPH TITLE**	**CERT**	**ANLS**	**DEMO**	**EXAM**	**TEST**	**PVT**	**FPVI**	**FPT**	**QCI**	**CNT**
3.11.3.11	HORN										
	a. Electric horn conforming to A-A-52525, type II	X						X			
	b. Air horn conforming to A-A-52525, type I	X						X			
	c. Operation of each horn					X		X		X	
3.11.3.12	ELECTRICAL CONNECTORS										
	a. Intervehiclar cable & receptacles				X			X		X	
	b. 12 pin NATO connector on rear of vehicle integrated into Blackout system				X			X			
	c. 7 pin connector IAW SAEJ560 on front & rear of vehicle integrated into 12 volt lighting system				X			X			
	d. Corrosion Resistance	X						X			
	e. Trailer Cable requirements				X			X		X	
	f. Cable Length				X			X		X	
	g. Water proof Connections	X						X			
3.11.3.12.1	LHST BRIDGING LIGHT BAR				X			X			
3.11.3.13	INSTRUMENTS/SWITCHES				X	X		X	X	X	X
3.11.3.14	MASTER POWER CUTOFF SWITCH					X		X	X	X	X
3.11.3.15	PRE-LUBRICATION SYSTEM				X			X	X	X	
3.11.3.16	DATABUS CONNECTIONS	X						X			
3.11.3.17	DIAGNOSTIC TOOLS			X				X		X	
3.11.2.17.2.1	DATA STORAGE			X				X			
3.11.3.18	BACKUP ALARM			X				X	X	X	X
3.11.4	FUEL SYSTEM										
	a. Conforms to FMCSR 393.65 and 393.67 requirements	X						X			
	b. Fuel line routing and protection				X			X	X	X	
3.11.4.1	FUEL TANKS										
	a. Corrosion Resistance	X						X			
	b. Equalized Distribution					X		X			
	c. Manual Shut-off				X			X		X	
	d. 3" diameter opening and safety type cap				X			X		X	
	e. Capture chain on cap				X			X	X		
	f. Location of Fill Hole				X				X		
	g. Removable strainer and drain plugs				X			X		X	

		VERIFICATION METHOD					VERIF. CLASS/EVENT				
SECT. 3	**PARAGRAPH TITLE**	**CERT**	**ANLS**	**DEMO**	**EXAM**	**TEST**	**PVT**	**FPVI**	**FPT**	**QCI**	**CNT**
	h. Sealed filler cap				X			X		X	
	i. Venting system				X			X			
	j. Fill port size					X		X			
3.11.4.2	FUEL/WATER SEPARATOR				X			X	X	X	
3.11.5	EXHAUST SYSTEM										
	a. Conforms to FMCSR 393.83	X						X			
	b. Gas tight and leakproof	X						X			
	c. Rain cap				X			X		X	
	d. Corrosion Resistance	X						X			
	e. Guards, shield and personnel protection check				X			X		X	
3.11.5.1	TOXIC GAS EXPOSURE					X		X	X		
3.11.6.1	TRANSMISSION										
	a. Automatic Transmission					X		X	X	X	X
	b. Down Shift Inhibitor System					X		X	X	X	X
	c. Starter Interlock					X		X		X	
	d. Gear Range selector				X			X		X	
	e. Neutral Interlock					X		X		X	
3.11.6.2	TRANSFER CASE					X		X	X	X	X
3.11.6.3	POWER TAKE-OFF (PTO) OPENINGS										
	a. PTO openings				X			X			
	b. Mission IV vehicle PTO output					X		X			X
	c. Power Assist to Semi-trailer axles				X			X			
3.11.6.4	STEERING										
	a. Full limit steering at GCW					X		X	X	X	X
	b. Emergency Steering					X		X	X		
	c. Dead Engine Steering Test					X			X		
	d. Free of interference				X			X		X	X
	e. Permanently Lubricated Joints				X			X		X	
	f. Steering Lock				X			X		X	
3.11.7	EXTERNAL, MHC OR LHS HYDRAULICS				X			X		X	
3.11.7.1	HYDRAULIC RESERVOIR										
	a. Readily accessible filters				X			X		X	
	b. Tank baffles				X			X		X	
	c. Level indicators				X			X		X	
	d. Pressure Vented cap					X		X			X

		VERIFICATION METHOD					VERIF. CLASS/EVENT				
SECT. 3	**PARAGRAPH TITLE**	**CERT**	**ANLS**	**DEMO**	**EXAM**	**TEST**	**PVT**	**FPVI**	**FPT**	**QCI**	**CNT**
	e. Internal accessibility				X			X			
	f. Hydraulic Reservoir Maintenance				X			X			
	g. Hydraulic System Cooler				X			X		X	
3.11.7.2	HYDRAULIC HOSES AND FITTINGS	X						X			
3.11.8.1	AXLE LUBRICATION				X			X	X	X	X
3.11.8.2	SUSPENSION				X			X	X		
3.11.9	RIMS AND TIRES										
	a. Meets SAE J1992 requirements	X						X			
	b. Conforms to FMVSS 571. 119 & 120 requirements	X						X			
	c. Interchangeable wheel assemblies				X			X			
	d. Tread Life	X			X			X	X		
3.11.9.1	SPARE TIRE AND WHEEL ASSEMBLY										
	a. Tire and wheel assembly				X			X		X	
	b. Mechanical Assist Device				X			X		X	
	c. Tools (Jack, Wrenches, etc)				X			X			
	d. Tire change (30 minutes/2 soldiers)			X				X	X		
	e. Single Jack Capability			X				X	X		
3.11.9.2	RUN-FLAT CAPABILITY (OBJECTIVE)			X				X	X		
3.11.9.3	WHEEL SPLASH AND STONE THROW PROTECTION										
	a. Splash shield and mudflaps				X			X		X	
	b. Conform to SAEJ682	X						X			
	c. Stone and mud protection					X		X	X	X	
	d. Compatible with semi-trailer and removable			X				X	X	X	
	e. Rear wheel fenders			X				X	X	X	
3.11.9.4	TIRE CHAINS				X			X			
3.11.9.5	LIMP HOME CAPABILITY			X				X	X		
3.11.9.6	CENTRAL TIRE INFLATION SYSTEM (CTIS)				X			X	X	X	
3.11.9.6.1	TIRE PRESSURE CONTROL					X		X	X	X	
3.11.9.6.2	SPARE TIRE				X			X		X	
3.11.9.6.3	MANUAL TIRE INFLATION/DEFLATION			X				X		X	
3.11.9.6.4	AIR-PRIORITY SYSTEM			X				X		X	

		VERIFICATION METHOD					VERIF. CLASS/EVENT				
SECT. 3	PARAGRAPH TITLE	CERT	ANLS	DEMO	EXAM	TEST	PVT	FPVI	FPT	QCI	CNT
3.11.9.6.5	SPEED/PRESSURE CONTROL WARNING			X				X	X	X	
3.11.9.6.6	MAINTENANCE OF TIRE PRESSURE			X				X			X
3.11.9.6.7	TIME TO INFLATION/DEFLATION					X		X	X		X
3.11.10	BRAKE CONFIGURATION										
	a. Conforms to FMVSS & FMCSR	X						X			
	b. Releasable from inside of cab			X				X		X	
3.11.10.1	SPLIT/ APPLY CIRCUITRY					X		X	X		
3.11.10.2	TRAILER BRAKE CONTROL SYSTEM				X			X	X	X	
3.11.10.3	GLAD HANDS										
	a. Conforms to SAE J318	X						X			
	b. Quantity, location, and marking				X			X		X	
	c. Retention chains for dummy couplers				X			X		X	
3.11.10.4	AIR COMPRESSOR										
3.11.10.4.1	a. Mission I,II,III,IV, VA & VC Vehicles				X			X		X	
3.11.10.4.2	b. Mission VB vehicles				X			X		X	
	1. 30 CFM Minimum capacity					X		X			
3.11.10.5	TRACTION CONTROL					X		X	X		
3.11.10.5.1	ANTILOCK BRAKING SYSTEM (ABS)										
	a. Conform to FMVSS 571.121					X			X		
	b. ABS Operation for Mission VB vehicles					X		X	X	X	
	c. ABS operation for Mission I, II,III,IV, VA & VC vehicles					X		X	X	X	
	d. ABS/Traction control system compatibility					X		X	X	X	
	e. Diagnostic Capability			X				X	X		
3.11.10.6	BRAKE WEAR INDICATOR (OBJECTIVE)				X			X		X	
3.11.11.1	TOWING EYES										
	a. Towing eye quantity check				X			X		X	
	b. LHST recoverability			X					X		
	c. Towing eyes withstand 60,000 #	X						X			
	d. Tow eyes accept towbars IAW 12322663			X				X			
	e. Tow shackles provided				X			X		X	
	f. Front tow eye location				X			X			

		VERIFICATION METHOD					VERIF. CLASS/EVENT				
SECT. 3	**PARAGRAPH TITLE**	**CERT**	**ANLS**	**DEMO**	**EXAM**	**TEST**	**PVT**	**FPVI**	**FPT**	**QCI**	**CNT**
3.11.11.2	PINTLE										
	a. Single operator hook-up					X		X			
	b. Towing various trailers			X					X		
	c. Pintle Operation				X			X		X	
3.11.11.2.1	MISSION I, II, III, AND IV VEHICLES										
	a. Conforms to size & strength of DRWG 8710630	X						X			
	b. Safety Chain attachment				X			X		X	
	c. Mounting/reinforcement check				X			X		X	
	d. Location and Height					X		X	X		
3.11.11.2.2	MISSION V VEHICLES (Threshold)										
	a. Self-Guiding operation					X		X		X	
	b. Safety Chain attachment				X			X		X	
	c. Mounting/lubrication fittings check				X			X		X	
3.11.12	CAB										
	a. Crash protection per FMVSS 571.208	X						X			
	b. Visibility at break over angles			X				X	X		
	c. Cab protection check				X			X	X		
3.11.12.1	SEATING										
	a. Seating for two (2) crewmembers				X			X	X		
	b. Seats adjustable, fore & aft, up & down					X		X		X	
3.11.12.2	WINDSHIELD AND WINDOWS										
	a. Solar glare reducing glass	X						X			
	b. Sun Visor operation check					X		X		X	
	c. Mechanical detent keeps visors in place.			X				X		X	
3.11.12.3	WINDSHIELD WIPERS & WASHERS										
	a. Multi-speed wiper motor check					X		X		X	
	b. Washer reservoir capacity check				X			X			
	c. Wipers/washers meet FMVSS 571.104 & SAE J198	X						X			
3.11.12.4	VEHICLE CAB INTERIOR										
	a. Proper Interior color				X			X		X	
	b. First Aid Kit installed			X	X			X		X	

		VERIFICATION METHOD					VERIF. CLASS/EVENT				
SECT. 3	**PARAGRAPH TITLE**	**CERT**	**ANLS**	**DEMO**	**EXAM**	**TEST**	**PVT**	**FPVI**	**FPT**	**QCI**	**CNT**
	c. Fire Extinguisher meeting FMCSR 393.95 installed	X		X	X			X		X	
	d. Cab undercarriage and doghouse insulation				X			X		X	
3.11.12.5	CAB FLOOR DRAINS				X			X		X	
3.11.12.6	CHEMICAL PROTECTIVE EQUIPMENT STORAGE				X			X	X		
3.11.12.7	M4/M16 RIFLE MOUNTING			X	X			X	X	X	
3.11.12.8.1	HEATER & DEFROSTER										
	a. Heater, Defroster and Blower provisions and operation					X		X		X	X
	b. Temperature check (-25 degrees to +41 degree F within 45 minutes of vehicle starting					X			X		
	c. Windshield defrost/defog IAW SAE J382 Area "A" at ambient temperatures of down to -50 degrees F (-46 degrees C) within 1 hour when tested IAW SAE J381					X			X		
3.11.12.8.2	CAB COOLING				X			X		X	
3.11.12.9	REAR VIEW MIRRORS										
	a. Mirrors conform to A-A 52432	X						X			
	b. Mirrors foldable towards body			X				X		X	
	c. Mirrors vibration free					X		X		X	
3.11.13	VEHICLE SECURITY				X			X		X	
3.11.14	STOWAGE										
	a. Stowage space with latching device check			X				X	X		
	b. Drain holes				X			X			
	c. BII stowage capability			X				X			
	d. BII protection				X			X		X	
3.11.15	RESERVED										
3.11.16	CONTROLS & CONTROL CABLES										
	a. Conforms to FMVSS 571.101 and 571.102	X						X			
	b. Operation					X		X		X	
3.11.17	REAR REFLECTIVE SIGNATURE										
	a. Conform to FMVSS 571.108	X						X			
	b. Application				X			X		X	
3.11.18	COLLISION WARNING SYSTEM										
	a. Visible and audible alarms			X				X		X	
	b. Compute closing speeds					X			X		
	c. Front antenna range					X			X		

		VERIFICATION METHOD					VERIF. CLASS/EVENT				
SECT. 3	PARAGRAPH TITLE	CERT	ANLS	DEMO	EXAM	TEST	PVT	FPVI	FPT	QCI	CNT
	d. Side blind spot indicator				X			X	X	X	
	e. Environmental Operations					X			X		
	f. Operation					X		X		X	
3.11.19	KITS										
	a. Installation			X					X		
	b. Mounting holes shall be filled with threaded fasteners				X			X		X	
3.11.19.1	ENGINE ARCTIC KIT										
	a. Heater installed				X			X		X	
	b. Heater operational test					X			X		
3.11.19.2	Reserved										
3.11.19.3	MACHINE GUN MOUNTING INTERFACE KIT										
	a. Machine Gun mounting kit installed				X			X		X	
	b. Machine Gun mount location				X			X			
	c. Operational check with M60, M2, MK 246					X			X		
	d. 360 degree traverse check					X			X		
	e. Protective Cover				X			X		X	
3.11.19.4	CARGO COVERING										
	a. Meets MIL-PRF 20696, Type I, Class 2 requirements	X						X			
	b. Vehicle height with tarps and bows installed NTE 11ft, 11 in					X		X			
3.11.19.5	GAS PARTICULATE FILTER UNIT (GPFU) INTERFACE KIT			X	X			X	X		
3.11.19.6	CHEMICAL ALARM INTERFACE KIT										
	a. Design and fabricate kits for Mission I,II, III,IV,VA,VC vehicles			X				X		X	
	b. Detector and alarm mounting for Mission VB vehicles				X			X		X	
	c. 10 minute installation using on-board tools			X				X	X		
3.11.19.7	DECONTAMINATION APPARATUS INTERFACE KIT			X	X			X	X		

		VERIFICATION METHOD					VERIF. CLASS/EVENT				
SECT. 3	**PARAGRAPH TITLE**	**CERT**	**ANLS**	**DEMO**	**EXAM**	**TEST**	**PVT**	**FPVI**	**FPT**	**QCI**	**CNT**
3.11.19.8	UNIVERSAL POWER INTERFACE KIT (UPIK) LHS VARIANTS VA,VB & VC ONLY										
	a. Location of kit mounting				X			X		X	
	b. Hydraulic power check- 30 gallons @ minute at 3000 psi					X		X	X		X
	c. Electric (25 amps @ 12 Volts and 25 amps @ 24 Volts					X		X	X		X
	d. Pneumatic (20 cubic feet/minute at 120 psi)					X		X	X		X
	e. Interlocks to prevent LHS operation while UPIK connected.					X		X			
3.11.19.9	CREW COMPARTMENT PROTECTION KIT				X			X	X		
3.11.19.10.1	Mission I, II, III,IV,VA & VC Vehicles Self-Recovery Winch										
	a. Location check				X			X		X	
	b. Winch Performance					X		X	X		X
	c. Cable length check				X			X			X
	d. Controls/Rollers/Clevis Ends				X			X		X	X
	e. Snatch block check				X			X		X	
	f. Design meets SAE J706 requirements	X						X			
	g. Tension mechanism check				X			X		X	X
3.11.19.10.2	Mission VB Vehicles Self-Recovery Winch										
	a. Location check				X			X		X	
	b. Winch Performance					X		X	X		X
	c. Cable length check				X			X			X
	e. Controls/Rollers/Clevis Ends				X			X		X	X
	f. Snatch block check				X			X		X	
	g. Design meets SAE J706 requirements	X						X			
	i. Tension mechanism check				X			X		X	X
3.11.19.11	EXTENDED DRAWBAR KIT					X		X	X	X	
3.11.19.12	BRIDGING LIGHT BAR KIT				X			X		X	
3.11.20	ADDITIONAL PROVISIONS (vehicle will have space for the following items...)										
3.11.20.1	ASSET TRACKING SYSTEM (MTS & FBCB2)			X				X			
3.11.20.2	DRIVER'S VISION ENHANCER (DVE)			X				X			

		VERIFICATION METHOD					VERIF. CLASS/EVENT				
SECT. 3	**PARAGRAPH TITLE**	**CERT**	**ANLS**	**DEMO**	**EXAM**	**TEST**	**PVT**	**FPVI**	**FPT**	**QCI**	**CNT**
3.11.20.3	AUTOMATIC ASSET IDENTIFICATION			X				X			
3.11.20.4	IDENTIFYING FRIEND OR FOE (IFF) DEVICES				X			X			
3.11.20.5	SELF-DEFENSE				X			X			
3.12.1	MISSION IA VEHICLE TYPE – LIGHT CARGO										
3.12.1.1	CARGO BODY										
	a. Payload Capacity Check					X		X			X
	b. Side, head & tailgate/dimensional check, removable			X		X		X	X		
	c. Cargo covering tiedowns				X			X		X	
3.12.1.1.1	CARGO TIEDOWNS										
	a. Meet MIL-STD 209 requirements	X						X			
	b. Quantity and spacing				X			X		X	
	c. ¼" hole in tiedowns				X			X		X	
3.12.1.2	MATERIAL HANDLING CRANE (MHC)										
	a. Operation					X		X		X	
	b. Conforms to OSHA & ASME B30.5	X						X			
3.12.1.2.1	LOCATION AND CAPABILITY					X		X		X	
3.12.1.2.2	STABILIZING SYSTEM										
	a. Slope requirements					X		X			X
	b. Conforms to ASME 30.5	X						X			
	c. Safety switch					X		X		X	
3.12.1.2.3	CRANE CONTROLS										
	a. Operation					X		X		X	
	b. Creep test					X		X			X
	c. Control Labels				X			X		X	
3.12.1.2.4	REMOTE CONTROL										
	a. Operation & Storage Location					X		X		X	
	b. Cable length					X		X			X
	c. Drain holes					X		X		X	
	d. Door seal				X			X		X	
	e. Shock resistant	X						X			
	f. Meet MIL-STD-810, method 512.4, procedure I	X						X			
	g. Meet MIL-STD-810, method 516.5, procedure IV	X						X			
3.12.1.2.5	OVERLOAD SHUTDOWN SYSTEM					X		X	X	X	
3.12.1.2.6	LOAD CAPACITY CHART				X			X		X	

		VERIFICATION METHOD					VERIF. CLASS/EVENT				
SECT. 3	PARAGRAPH TITLE	CERT	ANLS	DEMO	EXAM	TEST	PVT	FPVI	FPT	QCI	CNT
3.12.1.2.7	LINE LOAD WINCH										
	a. Line load capacity					X		X			X
	b. Conforms to ASME B30.5	X						X			
	c. Operation					X		X		X	
3.12.2.1	CARGO BODY, Heavy										
	a. Payload capacity check					X		X			X
	b. Side, head & tailgate/ dimensional check, removable			X		X		X	X		
	c. Cargo covering tiedowns				X			X		X	
3.12.2.1.1	CARGO TIEDOWNS										
	a. Meets MIL-STD 209 requirements	X						X			
	b. Quantity , Spacing & location				X			X		X	
	c. Pod feet retainers and tiedowns				X			X		X	
	d. ¼ " drain holes in tiedowns				X			X		X	
3.12.2.2	MATERIAL HANDLING CRANE (MHC) (SAME AS 3.12.1.2)										
3.12.2.2.1	LOCATION AND CAPABILITY					X		X		X	
3.12.2.2.2	STABILIZING SYSTEM (SAME AS 3.12.1.2.2)										
3.12.2.2.3	CRANE CONTROLS (SAME AS 3.12.1.2.3)										
3.12.2.2.4	REMOTE CONTROL (SAME AS 3.12.1.2.4)										
3.12.2.2.5	OVERLOAD SHUTDOWN SYSTEM (SAME AS 3.12.1.2.5)										
3.12.2.2.6	LOAD CAPACITY CHART (SAME AS 3.12.1.2.6)										
3.12.2.2.7	LINE LOAD WINCH (SAME AS 3.12.1.2.7										
3.12.3	MISSION II VEHICLE TYPE - TANKER										
3.12.3.1	OPERATION										
	a. Automatic Bottom load					X		X		X	
	b. Bulk Unload filtered and unfiltered fuel, 300 gpm					X		X		X	
	c. Gravity discharge through bulk discharge port with 4" pipe & hose, unfiltered fuel					X		X		X	
	d. Automotive fuel servicing, metered, filtered fuel with flow control valve			X				X			

		VERIFICATION METHOD					VERIF. CLASS/EVENT				
SECT. 3	PARAGRAPH TITLE	CERT	ANLS	DEMO	EXAM	TEST	PVT	FPVI	FPT	QCI	CNT
	e. Overwing aircraft servicing, metered filtered fuel, with flow control valve			X					X		
	f. Aircraft closed circuit refueling and D-1 , metered, filtered fuel, 100 gpm per hose			X					X		
	g. Defuel nozzle tube and evacuate hoses			X				X		X	
	h. Recirculate through all lines and hoses, D1 receptacle, D-1 type nozzle			X				X		X	
3.12.3.1.1	REGULATIONS	X						X			
3.12.3.2	CAPACITY					X		X	X	X	
3.12.3.3	SPACE ALLOCATION				X			X			
3.12.3.4	BULK DISCHARGE PORT HOSE										
	a. Hose length (15 ft) check					X		X		X	
	b. Conforms to A-A-59326/6 Class 1, 3 inch coupling	X						X			
	c. Pressure rating suitability for tanker requirements				X			X			
3.12.3.5.1	EMERGENCY VALVE				X	X		X		X	
3.12.3.5.2	METERING					X		X		X	
3.12.3.5.3	BOTTOM LOADING			X		X		X		X	
3.12.3.5.4	CONNECTORS				X			X	X	X	
3.12.3.5.5	HOSES AND REELS										
	a. Qty/Length of hoses/Quick connect fittings				X			X		X	
	b. Hoses meet API Std 1529, Grade 1 Type C requirements	X						X			
	c. Static Ground reel checks				X			X		X	
3.12.3.5.6	NOZZLES				X	X		X		X	
3.12.3.5.7	FILTER SEPARATOR										
	a. Completeness				X			X		X	
	b. Meets MIL-PRF-52308 requirements	X						X			
3.12.3.5.8	SAMPLING PROBE				X			X		X	
3.12.3.5.9	ALTERNATE BACK-UP FUEL DELIVERY					X		X		X	
3.12.3.5.10	TANK FUEL LEVEL INDICATOR				X			X		X	
3.12.3.5.11	GAGES				X			X		X	
3.12.3.5.12	PUMP MODULE LOCKING PROVISIONS				X			X		X	
3.12.3.6	FIRE EXTINGUISHER				X			X		X	
3.12.3.7	SYSTEM DRAIN				X			X		X	

		VERIFICATION METHOD					VERIF. CLASS/EVENT				
SECT. 3	**PARAGRAPH TITLE**	**CERT**	**ANLS**	**DEMO**	**EXAM**	**TEST**	**PVT**	**FPVI**	**FPT**	**QCI**	**CNT**
3.12.3.8	TANKER ACCESS LADDER				X			X		X	
3.12.4.1	RECOVERY AND RETRIEVAL (TOWING AND LIFT/TOWING) WRECKER										
3.12.4.1.1	RECOVERY			X					X		
3.12.4.1.2	RETRIEVAL			X					X		
3.12.4.1.3	RETRIEVAL SYSTEM			X					X		
3.12.4.1.4	RECOVERY ANGLES			X					X		
3.12.4.1.5	RETRIEVAL HEIGHT					X		X		X	
3.12.4.1.6	CHOCK PROVISIONS				X			X		X	
3.12.4.2.1	POWER PACK REMOVAL & INSTALLATION			X					X		
3.12.4.2.2	POWER PACK TRANSPORT			X					X		
3.12.4.2.3	GUN TUBE & MOUNT REMOVAL/ INSTALLATION			X					X		
3.12.4.3	MATERIAL HANDLING CRANE (MHC) (SAME AS 3.12.1.2)										
3.12.4.3.1	LOCATION & CAPABILITY										
	a. Crane location (rear of truck)				X			X			
	b. Lifting capability (7,500 lbs. @ 11 feet					X		X		X	
	c. Working traverse (370 degrees)					X		X		X	
	d. 125% static capacity check					X		X		X	
	e. Lift checks					X		X		X	
3.12.4.4	STABILIZING SYSTEM (SAME AS 3.12.1.2.2)										
3.12.4.5	CRANE CONTROLS (SAME AS 3.12.1.2.3)										
3.12.4.6	CRANE REMOTE CONTROL (SAME AS 3.12.1.2.4)										
3.12.4.7	OVERLOAD SHUTDOWN SYSTEM (SAME AS 3.12.1.2.5)										
3.12.4.8	LOAD CAPACITY CHART (SAME AS 3.12.1.2.6)										
3.12.4.9	SELF-RECOVERY WINCH (SAME AS 3.11.19.10)										
3.12.4.10	HEAVY DUTY RECOVERY WINCH										
	a. Meet SAE J706	X						X			
	b. Length of useable wire (185 feet required)				X			X		X	
	c. Max operational rating (line pull) check					X		X			X

		VERIFICATION METHOD					VERIF. CLASS/EVENT				
SECT. 3	**PARAGRAPH TITLE**	**CERT**	**ANLS**	**DEMO**	**EXAM**	**TEST**	**PVT**	**FPVI**	**FPT**	**QCI**	**CNT**
3.12.4.10.1	HEAVY DUTY RECOVERY WINCH SYSTEMS AND CONTROLS										
	a. Side mounted controls				X			X			
	b. Remote control with 35 foot cord (Threshold)				X			X			X
	c. Wireless remote operations within 35 feet of back of vehicle					X		X		X	
3.12.4.11	Reserved										
3.12.4.12	Reserved										
3.12.4.13	ANCHOR/SPADE DEPLOYMENT			X					X		
3.12.5	MISSION IV VEHICLES - TRACTOR										
3.12.5.1	FIFTH WHEEL										
	a. Full oscillating, 36 in diameter fifth wheel with fork and locks for SAE J848, 3.5" kingpin				X			X		X	
	b. Side uncoupling operation			X				X		X	
	c. Secondary manual lock			X				X		X	
3.12.5.1.1	SWING CLEARANCE			X					X		
3.12.5.1.2	MOUNTING	X						X			
3.12.5.1.3	FIFTH WHEEL HEIGHT					X		X		X	
3.12.5.2	MAINTENANCE PLATFORM				X			X		X	
3.12.5.3	HOSE TENDER AND CABLE SUPPORTS				X			X		X	
3.12.5.4	TOWED VEHICLES			X					X		
3.12.5.5	Reserved										
3.12.5.6	EXTERNAL OR MHC HYDRAULICS (SAME AS 3.12.1.2.3)										
3.12.5.7	SPARE TRAILER TIRE				X			X		X	
3.12.5.8	NATO CONNECTORS				X			X			
3.12.6	MISSION VA, VB AND VC VEHICLES - LIGHT & HEAVY LOAD HANDLING SYSTEMS (LHS) AND COMMON BRIDGE TRANSPORTER (CBT)			X				X		X	
3.12.6.1	LIFTING CAPABILITY			X				X		X	
3.12.6.2	LOADING/UNLOADING TIME a. Load /unload fully loaded FR to/from truck in one (1) minute			X				X		X	
3.12.6.3	HEIGHT LIMITATIONS					X		X	X		

		VERIFICATION METHOD					VERIF. CLASS/EVENT				
SECT. 3	**PARAGRAPH TITLE**	**CERT**	**ANLS**	**DEMO**	**EXAM**	**TEST**	**PVT**	**FPVI**	**FPT**	**QCI**	**CNT**
3.12.6.4	CBT BRIDGE BAY WATER LAUNCH AND RETRIEVAL					X		X	X		
3.12.6.5	FR/CONTAINER/BAP LOCKING			X				X	X	X	X
3.12.6.6	LHS OVERLOAD					X		X	X	X	
3.12.6.7	SLAVE HYDRAULICS										
	a. Hose Characteristics				X			X		X	
	b. Emergency BAP removal			X				X			X
3.12.6.8	HYDRAULIC SYSTEM AND CONTROLS			X	X			X		X	
3.12.6.8.1	HYDRAULIC SYSTEM CLEANLINESS	X						X			
3.12.6.8.2	MANUAL OPERATION OF SOLENOID CONTROL VALVES			X				X			X
3.12.6.9	MATERIAL HANDLING CRANE (MHC) FOR MISSION VB2 VEHICLES (SAME AS 3.12.1.2)										
3.12.6.9.1	LOCATION AND CAPABILITY										
	a. Lifting 3900 # from FR					X		X		X	
	b. Lift radius check					X		X		X	
	c. Working traverse of 180 degrees					X		X		X	
	d. Capacity Check (125%)					X		X		X	
	e. Complies with OSHA safety standards	X						X			
3.12.6.9.2	STABILIZING SYSTEM (SAME AS 3.12.1.2.2)										
3.12.6.9.3	CRANE CONTROLS (SAME AS 3.12.1.2.3)										
3.12.6.9.4	FIXED OPERATOR'S STATION										
	a. Operation				X	X		X		X	
	b. Meet MIL-STD- 810	X						X			
3.12.6.9.5	REMOTE CONTROL (SAME AS 3.12.1.2.4)										
3.12.6.9.6	OVERLOAD SHUTDOWN SYSTEM (SAME AS 3.12.1.2.5)										
3.12.6.9.7	LOAD CAPACITY CHART (SAME AS 3.12.1.2.6)										
3.12.6.9.8	LINE LOAD										
	a. Line load capacity & Operation					X		X		X	
	b. Conforms to ASME B30.5	X						X			
3.12.6.9.9	BOOM ANGLE INDICATOR			X	X			X		X	

		VERIFICATION METHOD					VERIF. CLASS/EVENT				
SECT. 3	**PARAGRAPH TITLE**	**CERT**	**ANLS**	**DEMO**	**EXAM**	**TEST**	**PVT**	**FPVI**	**FPT**	**QCI**	**CNT**
3.12.6.10	CBT OPERATOR'S PLATFORM				X			X		X	
3.12.6.11	CBT PNEUMATIC SYSTEM PERFORMANCE			X				X		X	
3.12.6.12	Reserved										
3.12.6.13	Reserved										
3.12.7	MISSION VI VEHICLES - LOAD HANDLING SYSTEM TRAILER (LHST)					X		X		X	
3.12.7.1	DRAWBAR			X				X		X	
3.12.7.2	BACKING ASSIST DEVICE			X				X		X	
3.12.7.3	STOWAGE BOX				X			X		X	
3.12.7.4	LHST EQUIPMENT				X			X		X	
3.12.7.5	SAFETY CHAINS										
	a. Chains available				X			X		X	
	b. Meets SAEJ697	X						X			
3.12.7.6	CONTAINER/SHELTER TRANSPORT			X				X	X		
3.12.7.7	FR LOADING			X				X		X	
3.13	EXTENDED SERVICE PROGRAM (ESP) VEHICLES/COMPONENTS										
3.13.1	VEHICLE RECONDITIONING/ASSEMBLY				X			X		X	
3.13.1.1	FRAME ASSEMBLY				X			X		X	
3.13.1.2	AXLES AND SUSPENSION				X			X		X	
3.13.1.3	ENGINES				X			X		X	
3.13.1.4	TRANSMISSION				X			X		X	
3.13.1.5	OEM INSTALLED ENGINE ACCESSORIES				X			X		X	
3.13.1.6	TRUCK CAB										
	a. Body check				X			X		X	
	b. New glass/channels				X			X		X	
	c. Seat belts meets FMCSR 209 & FMVSS 21 requirements	X						X			
3.13.1.7	STEERING				X			X		X	
3.13.1.8	FUEL TANKS, AIR TANKS, RESERVOIRS AND BRAKE SYSTEM				X	X		X		X	
3.13.1.9	WHEELS AND TIRES				X			X		X	
3.13.1.10	BATTERIES				X			X		X	
3.13.1.11	SELF-RECOVERY WINCH				X			X		X	

		VERIFICATION METHOD					VERIF. CLASS/EVENT				
SECT. 3	PARAGRAPH TITLE	CERT	ANLS	DEMO	EXAM	TEST	PVT	FPVI	FPT	QCI	CNT
3.13.1.12	LIGHTS				X			X		X	
3.13.1.13	OTHER COMPONENTS				X			X		X	
3.13.1.13.1	AIR CLEANER				X			X		X	
3.13.1.13.2	SELF-RECOVERY WINCH CONTROL VALVE				X			X		X	
3.13.1.13.3	DRAG LINKS AND TIE RODS				X			X		X	
3.13.1.14	SPECIFIC VEHICLE MANUFACTURING REQUIREMENTS				X			X			
3.13.1.14.1	TANKER TRUCK										
3.13.1.14.1.1	BULK FUEL TANK										
	a. Meet DOT 406 requirements	X						X			
	b. New mounting springs				X			X		X	
3.13.1.14.1.2	PUMPING MODULE										
	a. Valves, pumps, seals, reels and gauges reconditioned or new				X			X		X	
	b. Filters, strainers and hose meet DOT 406 requirements	X						X			
3.13.1.14.2	LIGHT LHS AND CBT (See 3.12.5)										
3.13.1.14.2.1	CBT 36,000 LB REAR SPRINGS	X						X			
3.13.2	MATERIALS, PAINTING, MARKING AND CORROSION (SAME AS Paragraph 3.6)										
3.14	WORKMANSHIP				X	X		X	X	X	
3.15	SERVICING & ADJUSTING				X	X		X	X	X	

4.4 First Production Vehicle Inspection.

4.4.1 In-Process Inspection. During fabrication of first production vehicle, in-process inspections shall be performed by the contractor and witnessed by government representatives, to evaluate conformance to the section 3 requirements referenced in Table V for those items and/or processes which can not be evaluated once the end item is in it's final form. In addition, evaluation of process controls and workmanship shall be made at this time. During the inspection, the contractor shall have available for review and evaluation the following records: quality manual (or appropriate document) work instructions, process procedures, inspection records, and welder certifications. When directed by the government, these inspections shall be made prior to the application of primer and paint.

4.4.2 Contractor Inspection. The first production vehicle shall be inspected by the contractor, as a minimum, to the requirements of Table V. Upon completion of inspection, the contractor shall submit this vehicle, and all records associated with its inspection, to the designated government element for review and/or additional verification. The government reserves the right to witness and/or participate in this inspection.

4.4.3 First Production Vehicle Disposition. When required by contract, the vehicle, which was used for First Production Vehicle Inspection, shall remain at the manufacturer facility as a manufacturing standard and shall be the last vehicle delivered on the contract.

4.5 Production Verification Test. Upon completion of First Production Vehicle Inspection, one or more production vehicles shall undergo production verification testing at a designated government approved test site to evaluate conformance to section 3 requirements as referenced in Table V. When required by contract, after completion of Production Verification Test, test vehicle(s) shall be updated to the approved final first article configuration. Unless otherwise stated in the contract, Production Verification Test, test vehicles will be operated in accordance with the test profile (Table VI, VII, VIII, IX, X) below:

TABLE VI - 20,000 MILE DURABILITY TEST PROFILE

Mission I, II, III, IV, VA and VC Vehicles - Threshold

%	TERRAIN	MAX SAFE SPEED UP TO	TOTAL MILES	MILES (PER INTERVAL)
15	Hard Surface	55 mph	3,000	(150)
75	Secondary Road	45 mph	15,000	(750)
5	Cross Country - Level	30 mph	1,000	(50)
5	Cross Country - Hilly	15 mph	1,000	(50)

Mission I, II, III, IV, VA and VC Vehicles - Objective

%	TERRAIN	MAX SAFE SPEED UP TO	TOTAL MILES	MILES (PER INTERVAL)
15	Hard Surface	55 mph	3,000	(150)
25	Secondary Road	45 mph	5,000	(250)
10	Cross Country	30 mph	2,000	(100)
50	Trails	15 mph	10,000	(500)

Note: All test distances are to be accomplished with the LHST payloaded to its maximum required capacity of the towing vehicle payload, 50% of the time, 1/2 maximum required capacity 25% of the time, and no load 25% of the time.

TABLE VII - 20,000 MILE DURABILITY TEST PROFILE

Mission VB and VI Vehicles

%	TERRAIN	MAX SAFE SPEED UP TO	TOTAL MILES	MILES (PER INTERVAL)
25	Hard Surface	55 mph	5,000	(250)
25	Hilly Secondary Road	45 mph	5,000	(250)
25	Level Secondary Road	45 mph	5,000	(250)
10	Hilly Trails	30 mph	2,000	(100)
10	Level Trails	30 mph	2,000	(100)
2-1/2	Hilly Rough Trails	15 mph	500	(25)
2-1/2	Level Rough Trails	15 mph	500	(25)

Note: All test distances are to be accomplished with the LHST payloaded to its maximum required capacity, 50% of the time, 1/2 maximum required capacity 25% of the time, and no load 25% of the time. Trailer test distances shall be equally accumulated with both prime movers with MHC and prime movers without MHC.

TABLE VIII
TEST SCENARIO CYCLING PER FLATRACK - PRIME MOVER

PERCENT	TEST COURSE	TOTAL MILES	TOTAL CYCLES
25	Primary Roads	1500	25
50	Secondary Roads	3000	50
20	Trails	1200	20
5	Rough Trails	300	5

TABLE IX
TEST SCENARIO CYCLING PER FLATRACK - TRAILER

PERCENT	TEST COURSE	TOTAL MILES	TOTAL CYCLES
25	Primary Roads	1500	25
50	Secondary Roads	3000	50
20	Trails	1200	20
5	Rough Trails	300	5

4.6 Quality Conformance Inspection. Each vehicle produced shall undergo a complete final inspection by the contractor to the degree necessary to assure a defect free product. This inspection shall include those section 3 requirements as referenced in Table V. The Quality Conformance Inspection shall be conducted and documented using a contractor prepared and government approved Final Inspection Record.

4.7 Control Test. To demonstrate continuous control of the manufacturing operation, Control Tests shall be conducted by the Contractor at the manufacturing facility. The Contractor shall conduct all tests referenced in Table V. Mission I, II, III, VA and VC Vehicles shall be tested at GVW payloads as specified in Table IV. Mission IV Vehicles shall be tested at GCW payload as specified in Table IV with a surrogate trailer. Mission VB1 and VB2 Vehicles shall be tested at GCW payloads as specified in Table IV with the LHST. All payloads shall be actual or simulated. The test vehicle shall be operated for a minimum of 50 miles on a hard surface road. After the road test the vehicle shall be examined for leaks, damage, cracks, and permanent set. The Government may elect to witness and participate in any or all testing.

4.8 Follow-on Production Test. When required by contract, one production vehicle shall undergo follow-on production testing at a designated government approved test site to evaluate continued conformance to section 3 requirements as referenced in Table V. Test shall be 6,000 miles, matching the terrain and load percentages in Tables VI and VII.

4.8.1 Test deficiencies. Test vehicle deficiencies found during or as a result of the Initial Production Test may result in the Government stopping acceptance on subsequent vehicles until the conditions causing failures have been corrected by the contractor. All corrective actions carried out as a result of the deficiencies found during or as a result of IPT may be successfully demonstrated during a full retest to the portion of the IPT as directed by the Government Contracting Officer.

4.9 Repair of defects. Defects noted during the above Verification Matrix inspections shall be corrected by the contractor at no additional cost to the Government. Vehicles shall not be shipped for any Government testing until all inspection defects have been corrected and approved by the Government Contracting Officer.

5. PREPARATION FOR DELIVERY

5.1 Vehicles. Vehicles shall be processed in accordance with the contract and the approved Equipment Preservation Data Sheets (EPDS). Vehicles shall be provided for drive-away capability unless otherwise specified.

5.2 Basic Issue Items. Basic Issue Items shall be preserved, packaged and packed into wood boxes and be packed separately from other equipment.

5.3 Deprocessing instructions. The contractor shall prepare deprocessing instructions for each vehicle that will enable receiving personnel to place the vehicle in full operation condition.

5.4 Marking. The vehicles and shipping containers shall be marked in accordance with MIL-STD-129 for Department of Defense shipments.

6. NOTES

6.1 Intended use. The intended use of this system is combat support, through the transport of mass quantities of ammunition from the corps area forward.

6.2 Ordering data. Procurement documents should specify the following:

a. Title, Number and Date of specification

b. Quantity of initial production vehicles

c. Arctic kit, manufacturer furnished and installed, if required

d. Alternator kit, manufacturer furnished and installed, if required

e. Machine gun mounting kit, manufacturer furnished and installed, if required

f. Gas Particulate Filter Unit kit, manufacturer furnished and installed, if required

g. Chemical Alarm kit, manufacturer furnished and installed, if required

h. Decontamination Apparatus kit, manufacturer furnished and installed, if required

i. Self Recovery Winch kit, manufacturer furnished and installed, if required

j. FR Sideboard Kit, manufacturer furnished and installed, if required

k. Welding Procedures

l. First Article Test

m. Certifications

n. Material Handling Crane, manufacturer furnished and installed, if required

6.3 Definitions. For the purpose of this specification the following definitions shall apply.

6.3.1 After market part. Any part or component that has been manufactured or fabricated by a company other than the original equipment manufacturer or their approved subcontractors, and sold as a replacement part for an OEM part or component.

6.3.2 Condition Code A. Serviceable without qualification. New, used, repaired or reconditioned material that is serviceable and issuable to all customers without limitation or restriction. Includes material with more than 6 months shelf life remaining, level of preservation and packaging is not a restriction for issue.

6.3.3 Cone Index (CI). An index of the shearing resistance of a medium at any depth by a penetrometer. The resistance to penetration by a 30 degree cone with a 0.5 square inch circular base is expressed in pounds of force on the handle per square inch of the base area. In the basic Waterways Experiment Station (WES) Vehicle Cone Index (VCI) system the CI is considered as an index only, and no direct meaning is assigned to it's dimensions.

6.3.4 Cycle. A cycle shall start when a FR loaded to a predetermined payload is on the ground, and the LHS is in a secure non-load/unload position at the front of the truck. Next the LHS shall attach to the FR, load and secure it to the truck. Next the LHS shall unsecure the FR and unload it to the ground, and finally the LHS will return to it's original position.

6.3.5 Disassembly. The disassembly of the truck and its components to a level that allows a thorough inspection.

6.3.6 FR Degradation. Cracked welds, cracked material, permanent deformation, or any other indication of a decline of the structural integrity of the FR.

6.3.7 Gross Combination Weight (GCW). The GCW shall be defined as the sum of the GVW and the maximum towed load.

6.3.8 Gross Vehicle Weight (GVW). The GVW shall be defined as the sum of the VCW and the payload.

6.3.9 Mission-Oriented Protective Posture MOPP IV. The highest level of individual protection during chemical or germ warfare to facilitate mission accomplishment. Overgarments, overboots, mask/hood and gloves will be worn at this level of protection.

6.3.10 Modernization. Replacing obsolete and/or unsupportable functional components

and parts with those that are used on the manufacturer's current production model.

6.3.11 Nonserviceable part. Any part that no longer can be reconditioned to meet the minimum OEM standards.

6.3.12 OEM. The original equipment manufacturer that originally manufactured, fabricated or supplied a part. OEM may also refer to a subcontractor that manufactured or fabricated an item from an original equipment manufacturer.

6.3.13 Paint, corrosion and rust removal. The removal of paint to a degree that allows for a thorough inspection and proper sanding, repainting and the removal of all corrosion and rust.

6.3.14 Primary Roads. Two or more lanes, all weather, maintained, hard surface (paved) roads with good driving visibility used for heavy and high density traffic. These roads have lanes with a minimum width of 108 inches (2.75 M), road crown to 20 degrees and the legal maximum GVW/GCW for the country or state is assured for all bridges. These roads are surfaces having Root Mean Square (RMS) value of 0.1 inch (2.54 mm).

6.3.15 Rating Cone Index (RCI). The product of the measured CI and the RI of the same layer.

6.3.16 Reconditioning. The disassembly, cleaning, repair and/or replacement, testing and inspection, based on the OEM's specifications of all functional and structural components and parts of an end item to restore the item to such mechanical condition that its performance characteristics shall be equal to that of a new item of the same type.

6.3.17 Remolding Index (RI). A ratio that expresses the proportion of original strength of a medium that will remain under a moving vehicle. The ratio is determined from CI measurements made before and after remolding a 6 inch long sample using special apparatus.

6.3.18 Rough Trails. Vehicle operations over terrain not subject to repeated traffic in addition, no roads, routes, well-worn trails or man made improvements exist (This definition does not apply to vehicle test courses which are used to simulate cross-country terrain). These are surfaces having an RMS value varying between 1.5 inches (38.1 mm) - 2.0 inches (50.8 mm).

6.3.19 Secondary Roads. Two lanes, all weather, occasionally maintained, hard or loose surface (e.g., large rock, paved, crushed rock, gravel) intended for medium-weight, low-density traffic. These roads have lanes with minimum width of 98.5 inches (2.5 M) and no guarantee that the legal maximum GVW/GCW for the country or state is assured for all bridges. These roads are surfaces having a RMS value varying between 0.3 inch (7.63 mm) - 0.6 inch (15.24 mm).

6.3.20 Seep. Any recurring evidence of fluid beyond the seal that does not result in formation of a droplet.

6.3.21 Serviceable part. Any part that is capable of meeting or exceeding the minimum OEM standards for performing the function for which it was originally designed.

6.3.22 Trails. One lane, dry weather, unimproved, seldom maintained loose surface roads, intended for low density traffic. Trails have a minimum width of 98.5 inches (2.5 M), no large obstacles (boulders, logs, stumps) and no bridging. These are surfaces having an RMS value varying between 0.5 inches (12.7 mm) - 1.5 inches (38.1 mm).

6.3.23 Vehicle Cone Index (VCI). The minimum soil strength in the critical soil layer in terms of RCI for fine grained soils, and CI for coarse grained soils, required for a specific number of passes of a vehicle. VCI1 indicates only 1 (one) pass.

6.3.24 Vehicle Curb Weight (VCW). The VCW shall include the weight of the truck (or trailer), including MHC(if applicable), with all kits, attachments, accessories, equipment, BII and full complement of fuel, lubricants, coolants, hydraulic fluid and crew. It shall not include the weight of the FR.

6.3.25 Threshold. An item or requirement is considered a threshold requirement when it is mandated that this item or requirement shall be met with this purchase description. Requirements within this document without a specified designation of either threshold or objective are considered threshold values.

6.3.26 Objective. An item or requirement is considered an objective when it is not required to be met with this performance description. It is optional for the manufacturer to meet these requirements. When a single item or requirement has both a threshold and objective, the manufacturer has the option of meeting the threshold, the objective, or both. The manufacturer must at a minimum meet one of these options. If there is a conflict over the threshold and objective requirements stated in this document, the threshold shall be used.

6.4 Vehicle overspray. The following items shall not be painted/oversprayed:

Air Springs (Air Bags)
Data Plates
Fuel/Water Separator Plastic Bowl
Air Drain Valves on Air Tanks (Pull Cable Type)
Self Recovery Winch Cables
Tire Davit Winch Cables
Axle Air Vent Valves
Mud Flaps
Brake Caging Bolts, Nuts and Rust Caps
Tires
Reflectors and Clearance Light Lens
Sight Indicators for Fluid Levels
Fuel Tank Fill Lines (Painted on Outside of Tank)
Hydraulic Hoses

Air Hoses and Air Lines
Wire Connections and Harnesses
Chrome Plating on Hydraulic Cylinders
Rubber Mounts – Cab, Engine, Transmission, Engine Computers, etc.
Engine Exhaust Ducting
Electrical Connectors, Proximity Switches, Limit or Position Switches
Door Seals, BII Storage Box Door Seals
Engine Hood Rubber Flaps
Material Handling Crane Turn Table Gear Teeth
Fifth Wheel Surface
Rollers (i.e. PLS and HEMTT M1977 Loading Rollers)
Quick Release Pins, Snap Rings and Telescoping Tubes or Tow Bars
Safety Straps (i.e. Spare Tire Mounting)
Rubber Protective Covers
Rubber Strips under Fuel Tank Mounting Straps
Air Connections (Glad Hands)
Composite Light Lens
Oil Filter Cartridges

APPENDIX A

WATERPROOF VERIFICATION TEST PROCEDURE

PROCEDURE 1 - Pretest Performance Record.

Step 1 - Prior to submersion, rotating (continuous operation) and non-rotating components shall be installed in a test circuit equivalent to their normal dry environment and operated both mechanically and electrically, as applicable, for a period of 30 minutes at full rated current and voltage. Rotating (intermittent operation) components, shall be operated three times for 30 seconds each. Operation shall be with no load, at reduced voltage (18-20 volts), at five minute intervals shall be allowed between each operation.

PROCEDURE 2 - Test Procedure

Step 1 - The component, with its electrical connections, shall be submerged in a container with the uppermost surface a minimum of one inch below the surface of the saline solution and installed in the chamber. The salt used shall be sodium chloride containing on a dry basis not more than 0.1 percent of sodium iodide and not more than 0.2 percent of total impurities. The solution shall be prepared by dissolving 5 parts by weight of salt in 95 parts by weight of distilled water or other water containing not more than 200 parts per million of total solids. The solution shall be kept free of sediment by filtration or decantation. The component shall be carefully observed during its entire period of submersion and shall be operated while submerged for 30 minutes at full rated current and voltage. The chamber shall be evacuated to a pressure six pounds below atmospheric so as to apply a minimum of six pounds per square inch (psi) in-internal pressure to all voids within the component. Test results obtained shall be compared with the data obtained from the test of Procedure 1. During this period the component shall be carefully observed for poor seals, as evidenced by bubbles escaping from the interior of the component. (The term "leakage", as used in this document, is intended to mean that there shall be no bubbles escaping from the interior of the component when the test chamber is evacuated to a pressure six pounds below atmospheric). Leakage thus indicated shall be considered as noncompliance with the waterproofness requirement and the component shall be rejected. Bubbles which are the result of entrapped air on the exterior surfaces of the component shall not be considered a leak.

Step 2 - The chamber shall then be pressurized to six pounds above atmospheric and the component again operated for 30 minutes. Test results obtained shall be compared with the data from the test of Procedure 1.

Step 3 - Class 1 components only shall be disassembled as normally required in servicing and inspection made for the presence of water. If water is present, the component shall be rejected. If the component is dry, it shall be reassembled and subjected to 15 hours of dry operation (three 5-hour periods) at full rated current and voltage. The results shall be compared with the test data obtained under Procedure 1 (prior to initial submersion). Insulation breakdown or other damage

that would impair mechanical or electrical operation of the component shall be considered as evidence of failure.

Failure criteria - Components shall evidence no leakage and shall be mechanically and electrically operable during and subsequent to submersion, when subjected to the tests specified in Procedure 2, steps 1, 2 and 3.

APPENDIX B

OPERATIONAL REQUIREMENTS DOCUMENT (ORD)

FOR THE

TACTICAL WHEELED VEHICLE
CREW PROTECTION KIT (CPK)

1 . General Description Of Operational Capability.

a. Overall Mission Area. The CPK provides increased crew survivability for tactical wheeled vehicles (TWVs) where needed, while operating throughout the area of operation. Initially, the CPK is planned for use with contingency forces in operations with a low probability of armed conflict.

b. Type of Kit Proposed. The CPK shall increase survivability of vehicle crew against small arms fire, artillery/mortar fire, mines, submunitions, and improvised explosive devices.

c. Operational and Support Concepts.

(1) The CPK shall be tailored to various TWVs. Provisions for mounting the kit shall be applied under a modification work order (MWO) for each type vehicle. Once the MWO is applied, the protective parts of the CPK shall be installed at unit level when needed.

(2) The design philosophy of the CPK shall be protection for the individual crew members as opposed to :the entire crew compartment. Design of 'the CPK shall be such that combinations of various components shall provide various levels of protection. This enables commanders to tailor protection based on operational payload penalties and protection needed to meet the perceived threat.

(3) The CPK shall require no maintenance beyond standard preventative maintenance checks and services (PMCS) performed by the vehicle crew using onboard basic issue item (BII) tools. Easily replaceable parts shall permit unit level replacement of portions of the kit without special tools or unique skills.

d. This ORD supports the crew protection requirement in paragraph 2a of the Mission Need Statement for Ballistic Protection Systems, catalog of approved requirements documents reference number 21-93, approved by Department of Army (DA) on 6 Oct 93.

e. Unless otherwise specified, the CPK will be designed to protect a crew of two. Protection shall be provided for two additional passengers in some versions of the High Mobility multipurpose Wheeled Vehicle (HMMWV). Protection shall be provided for four additional

passengers in the M1070 Heavy Equipment Transporter System (HETS) tractor.

f. Protection for ambulance bodies, van bodies, shelters, and cargo areas is not included under this ORD.

2. Threat. Armed forces under conditions other than war will vary greatly in operational characteristics, organization, equipment, and degree of sophistication. Under circumstances where national armies have disintegrated, those forces could be equipped and organized in the manner of that nation's former army. Short of the disbanding of national armies, weaponry will usually consist of small arms (up to 14.5mm), hand portable antitank weapons (light antitank weapons, rocket propeller grenades, etc.), and nonstandard weapons (improvised explosive devices, incendiaries, rocks, etc.). Large caliber artillery and mortars up to 120mm are possible. Mines will be a problem worldwide. Inventories consist of large numbers of inexpensive, unsophisticated but reliable systems, as well as a smaller number of the most sophisticated models available on the world markets. The most common mines encountered on routes will continue to be large blast mines. Off-route fragmentation mines are the next most prevalent threat.

3. Shortcomings of existing Systems. Current TWVs lack armor protection to provide .crew survivability against small arms, artillery/mortar, and mines. With the possible exception of the Up-Armored Heavy HMMWV Variant (HHV), there are no existing ballistic protection systems that meet the requirements. This ORD does not apply to the Up-Armored HHV.

4. Capabilities Required. The CPK shall give all units the opportunity to provide ballistic protection to crews of TWVs. Although some degradation of vehicle payload and mobility may result, the basic features and capabilities of the vehicle shall remain intact.

a. System Performance.

(1) Armor Protection. The crew compartment shall provide the following ballistic protection in order of priority:

(a) The CPK shall protect the crew from blast, fragments, and injurious acceleration effects of blast mines up to the equivalent of 12 pounds of Composition B (required) with 16 pounds of Composition B (desired). The bottom fragmentation protection shall be equivalent to .5 inches of aluminum armor (required), rolled homogeneous armor (desired) in order to protect the crew from grenades, bomblets, and mortar rounds used as mines.

(b) The CPK for all TWVs shall, at a minimum, provide the crew protection from 7.62mm M80 ball (required) with 7.62mm armor piercing (AP) B32 rounds or their equivalent desired.

1. The CPK glass panels shall provide a 90 percent probability of no perforation at a 90 percent confidence level when tested against the 7.62mm M80 ball round (7.62 AP B32 desired) at 0-degrees obliquity.

2. The CPK door panels shall provide a 90 percent probability of no perforation at a 90 percent confidence level when tested against the 7.62mm M80 ball round (7.62 AP B32 desired) at 0-degrees obliquity.

3. The CPK in all other crew areas, except the roof, shall provide a 90 percent probability of no perforation at a 90 percent confidence level when tested against the 7.62mm M80 ball round (7.62 AP B32 desired)-at 30-degrees obliquity.

4. The CPK roof panels shall provide a 90 percent probability of no perforation at a 90 percent confidence level when tested against the 7.62mm M80 ball round (7.62 AP B32 desired) at a 30-degree angle of depression.

5. The tester may substitute a .30 caliber AP M2 round at a velocity that provides equivalent performance into RHA as that of the 7.62mm AP B32 round. The tester shall set the spacing between projectile impacts in accordance with appropriate military standards for the given material.

(c) The crew compartment must stop 90 percent of artillery fragments (U.S. 155mm high energy (HE) round, M107 (Composition B)) fired at 60 meters, at any elevation or azimuth, with a 90 percent confidence level. The spacing between projectile impacts shall be set in accordance with appropriate military standards for the given material.

(2) Weapons Station. A weapons station protection kit is desired.

b. Logistics and Readiness.

(1) Vehicle Mission and Readiness.

(a) The CPK design shall minimize any degradation of the mission of the vehicle to which it is attached.

(b) The CPK design shall provide minimum interference with maintenance of the vehicle to which it is attached. Easy access to frequent maintenance areas shall be inherent in the CPK design. When parts of the CPK must be removed for vehicle maintenance, they shall be easily and quickly removable and reinstalled.

(c) Quantitative Reliability, Availability, and Maintainability (RAM) requirements are not appropriate for the CPK.

(2) Vehicle Payload. The CPK design shall minimize impact on vehicle payload. Any reduction of vehicle payload shall be well documented in the operator's handbook. When reduction in payload is absolutely unavoidable, work around operating procedures will be developed where possible. Such procedures may include slower speeds, etc. to permit as close to normal operations as possible with the CPK installed.

(3) Vehicle Mounted Kits and Equipment. The CPK design shall permit operation of vehicle mounted kits and equipment as closely as possible to standard procedures.

(4) Mobility and Tractive Effort. The installed CPK shall have minimal impact on mobility and tractive effort of the vehicle. Design of the underbody blast protection system shall minimize reduction of ground clearance.

(5) Maintenance Requirements.

(a) Neither the CPK nor the vehicle to which it is attached shall be adversely affected by operation of the vehicle over the full vehicle operational mode summary/mission profile in climatic areas of the world in which the vehicle was designed to operate.

(b) The CPK operator PMCS requirements shall be limited to inspection and tightening of mounting fasteners. The design shall reduce these requirements to no more than an average of ten minutes (five minutes desired) per day addition to the normal vehicle PMCS conducted by the vehicle crew using tools found in the vehicle BII.

(c) The CPK design shall be maintenance free above crew level. Required maintenance shall be limited to removal and replacement of battle damaged parts at organizational level. No special tools or skills shall be required.

(6) Battle Damage Repair (BDR). Easily replaceable components shall enhance CPK readiness during combat operations. Most BDR shall take place at organizational level by removing and replacing damaged parts. By design, mounting provisions shall be protected by the parts they support. Mounting provisions that must be welded to the vehicle shall be kept to a minimum to reduce necessity for evacuating vehicle to supporting maintenance for replacement.

(7) Parts Interchangeability. The CPK parts shall be interchangeable among vehicle types to the greatest extent possible. The connecting devices should be interchangeable as a minimum.

C. Critical System Characteristics.

(1) Vehicle Transportability. The installed CPK shall not degrade inherent vehicle transportability. Removal of some CPK parts may be necessary before shipment to meet this requirement.

(a) Preparation Time. Total additional time at the port to prepare a vehicle with installed CPK for shipment/use shall not exceed 15 minutes by a vehicle crew using BII tools. The operator handbook shall identify items that must be removed prior to reaching the port and then reinstalled at the unit maintenance facility once the vehicle arrives in country. This includes such items as the weapons station protection kit that require heavy lift equipment for removal, and items that must be removed to ensure proper axle loads.

(b) Parts Stowage. The CPK design shall provide stowage for parts that must be removed upon arrival at the port for vehicle shipment. The CPK parts shall be stowed within the allowable space envelope of the vehicle prepared for shipment. Requirements for shipment of CPK components that must be removed before arrival at the port shall be identified in the operator handbook.

(2) Nuclear, Biological, and Chemical (NBC) Contamination Survivability. According to Army Regulation (AR) 70-71 and DA approved Quantitative NBC Contamination Survivability criteria dated 12 Aug 91, armor plate, if used, will be coated with chemical agent resistant coating, or its state-of-the art equivalent. This provides protection against the effects of chemical agent contamination acrd later use of decontaminating solutions. The CPK shall be decontaminable, hardened to the effects of decontaminates, and compatible for use with mission oriented protective posture (MOPP) IV. The design of all CPK components and spare parts shall consider ease of decontamination. .

(3) Nuclear Survivability. The CPK shall not degrade the survivability of the host vehicle to high-altitude electromagnetic pulse (HEMP).

(4) Natural Environmental Factors. The CPK, when mounted, will operate within the basic vehicle's required environmental extremes and will not degrade the vehicle's ability to operate within these extremes. As a general rule, that includes all areas of the world having cold, basic, and hot climates (-50 to +120 degrees F.) and high humidity to dry, as defined in AR 70-38.

(5) Vehicle RAM. The CPK shall have negligible impact on the inherent RAM characteristics of the vehicle on which it is installed.

(6) Installation.

(a) Initial installation of the kit may require some direct support maintenance (organizational maintenance desired) to modify the vehicle by installing mounting provisions.

(b) Installation of the CPK protective parts on a modified vehicle shall be done at organizational level maintenance using assigned tools, equipment, and personnel. No welding shall be required.

(7) Storage. The CPK shall be stored for extended periods of time without adverse effects from weather, humidity, temperature, or sunlight in hot, basic, and cold climates as defined in AR 70-38.

5. Integrated Logistics Support (ILS).

a. Maintenance Planning. Once installed, maintenance of the CPK shall be at unit level. No depot level maintenance is anticipated. No contract maintenance shall be required.

b. Support Equipment. Units will support the CPK using standard unit level tools arid equipment. Operation and maintenance of vehicles with the CPK mounted shall require no new special tools.

c. Human Systems Integration.

(1) Personnel Assessment. There shall be no requirement for a new military occupational specialty (MOS). There shall be no changes in qualification requirements for operator and maintainer MOS's of the basic vehicle.

(2) Training Assessment.

(a) Training Concept. Fielding CPK may require minor changes to instructional presentation for nonresident unit, and institutional training. Training shall provide operator, maintainer, and support personnel skills necessary for effective employment of the CPK. The CPK shall not require embedded training or training devices.

(b) New Equipment Training (NET). The CPK shall not require NET. Training of existing skills and knowledge shall support operation and maintenance tasks.

(c) Nonresident Training. The Army envisions only a small impact on nonresident training. Transfer of skill and knowledge shall support operation and maintenance tasks. The Army Correspondence Course Program and Training Extension Course publications shall be revised to support unit individual and collective training in these areas, if required.

(d) Unit Training. The Army envisions only a minor impact on unit training. Transfer of skills and knowledge shall support operation and maintenance tasks.

(e) Institutional Training. The Army envisions only a minor impact on institutional training. The training base exists. Transfer of skills and knowledge shall :support operation and maintenance tasks.

(f) Reserve Component (RC) Training. The RC training requirement is the same as for Active Component (AC).

(3) Human Factors Engineering WE). An appropriate addendum to existing vehicle HFE analysis or evaluation may be required. Man/machine interface for the operation and maintenance of a vehicle with the CPK and for access to vehicularcarried cargo or towed load must permit safe and effective task performance. A vehicle with the CPK mounted, with or without trailer, must be operable and maintainable by representative 5th through 95th percentile soldiers while wearing individual protective clothing (Arctic and Mission Oriented Protective Posture 4) under all expected operational conditions.

(4) System Safety. A vehicle with the CPK installed shall follow applicable safety hazard abatement requirements. All hazards will be designed out or controlled to lower the risk, where possible. Remaining risk will be accepted/rejected as prescribed in AR 385-16. The vehicle with the CPK installed shall not present uncontrollable hazards to man, machine, or other systems interfacing with it in its operational environment.

(5) Health Hazard Assessment. A Health Hazard Assessment Program shall be initiated in accordance with (IAW) AR 40-10. Policies, guidelines, and procedures contained in AR 405, Technical Bulletin-Medical 503, Military Handbook 759-A and MIL-STD-1472C regarding control or elimination of potential health hazards shall be followed to the maximum extent feasible.

(6) Soldier Survivability. Installation and use of the CPK shall provide sufficient soldier protection to minimize injury if attacked.

d. Other Logistics considerations.

(1) The integrated logistics support plan (ILSP) shall be developed by the materiel developer with input from the user and updated throughout the acquisition process.

(2) The provisioning strategy shall be addressed in the ILSP.

(3) The current logistics support analysis/logistic support analysis record (LSA/LSAR) process shall be used to define logistics support and personnel tasks and skills for operation, maintenance, and support of the CPK.

(4) The CPK technical documentation shall be in the form of page changes to basic vehicle technical manuals.

(5) Any required authorized stockage list/prescribed load list and installation and support instructions shall be validated and verified prior to fielding.

6. Infrastructure Support And Interoperability. The CPK takes advantage of vehicle and parts commonality of current vehicle fleet fielded with Army units. Both U.S. Marine Corps and U.S. Air Force have interest in the CPK as it pertains to vehicles in their inventories. We anticipate foreign military sales interest based on world-wide fleet densities of the vehicles under consideration.

7. Face Structure. No changes in force structure shall be required. The CPK shall be issued on an as required basis for existing vehicles in a designated contingency force. Contingency force structure will be determined by DA, Deputy Chief of Staff for Operations and Plans (DCSOPS).

8. Schedule Considerations.

a. In-Process Reviews (IPR): To be determined.

b. Approximately one year following Milestone III, contingency units shall have attained full capability to employ the CPK effectively (the MWO will be applied to applicable vehicles and protective portions of the kit will be on hand in contingency storage locations). Kits for forward deployed and Continental U.S. based units (non-contingency corps units) will be procured, fielded, and installed in the DA master priority list sequence or as directed by DA, DCSOPS.

APPENDIX B

Annex A - Rationale

4. Capabilities Required. The CPK shall give all units the opportunity to provide ballistic protection to crews of TWVs. Although some degradation of vehicle payload and mobility may result, the basic features and capabilities of the vehicle shall remain intact.

a. System Performance.

(1) Armor Protection.- The crew compartment shall provide the following ballistic protection in order of priority:

(a) The CPK shall protect the crew from blast, fragments,. and injurious acceleration effects of blast mines up to the equivalent of 12 pounds of Composition B (required) with 16 pounds of Composition B (desired). The bottom fragmentation injurious acceleration effects of blast mines up to the equivalent of 12 pounds of Composition B (required) with 16 pounds of Composition B (desired). The bottom fragmentation protection shall be equivalent to .5 inches of rolled homogeneous armor (RHA) in order to protect the crew from grenades, bomblets, and mortar rounds used as mines.

(b) The CPK for all TWVs shall, at a minimum, provide the crew protection from 7.62mm ball (required) with 7.62mm armor piercing incendiary (API) B32 rounds or their equivalent desired.

1. The CPK glass panels shall provide a 90 percent probability of no perforation at a 90 percent confidence level when tested against the 7.62mm ball round (7.62 API B32 desired) at 0-degrees obliquity and at a 100 meter equivalent velocity.

2. The CPK door panels shall provide a 90 percent probability of no perforation at a 90 percent confidence level when tested against the 7.62mm ball round (7.62 API B32 desired) at 0-degrees obliquity and at a 100 meter equivalent velocity.

3. The CPK in all other crew areas, except the roof, shall provide a 90 percent probability of no perforation at a 90 percent confidence level when tested against the 7.62mm ball round (7.62 API B32 desired) at 30-degrees obliquity and at a 100 meter equivalent velocity.

4. The CPK roof panels shall provide a 90 percent probability of no perforation at a 90 percent confidence level when tested against the 7.62mm ball round (7.62 API B32 desired) at 30-degrees obliquity and at a 100 meter equivalent velocity.

5. The tester may substitute a .30 caliber AP M2 carbine round at a velocity that provides equivalent performance into RHA as that of the 7.62mm API B32 round. The tester

shall set the spacing between projectile impacts in accordance with appropriate military standards for the given material.

(c) The crew compartment must stop 90 percent of artillery fragments (U.S. 155mm high energy (HE) round, M107 (Composition B)) fired at 60 meters, at any elevation or azimuth, with a 90 percent confidence level. The 20mm fragment simulating projectile may be used as a surrogate. The spacing between projectile impacts shall be set in accordance with appropriate military standards for the given material.

RATIONALE. To enhance crew survivability against likely mines, small arms ammunition, and mortar/artillery fire anticipated in a peace keeping environment. The order of priority is based on mines being the most serious threat, followed by small arms and then mortars and artillery weapons. Priority of small arms protection is based on-the simplest fix having highest payoff first. Ballistic windshields are readily available at relatively low cost for protection payoff. Door panels offer a great deal of protection with little modification to the truck. Ballistic protection seats, such as those used in helicopters, offer a great deal of protection with low developmental effort. Adequate protection from, mortar/artillery blast may well be obtained once the small arms protection is provided. The 7.62mm ball round represents the most likely threat with the greatest severity. Although a 7.62mm API B32 round is a more severe threat, it is considered too costly in weight, dollars, and technology to be the standard of protection for all vehicles in this program. However, protection against the 7.62mm API B32 round may be suitable for some of the larger vehicles and therefore is a desired requirement.

(2) Weapons Station. A weapons station protection kit is desired.

RATIONALE. Weapons operators are in a vulnerable position while operating their weapons. Although we cannot provide a turret for weapon operator protection, a shield that provides protection nearly equivalent to the rest of the cab is desired.

b. Logistics an Readiness.

(1) Vehicle Mission and Readiness.

(a) The CPK design shall minimize degradation of mission of the vehicle to which attached.

(b) The CPK design shall provide minimum interference with maintenance of the vehicle to which it is attached. Easy access to frequent maintenance areas shall be inherent in the CPK design:' When parts of the CPK must be removed for vehicle maintenance, they shall be easily and quickly removable and reinstalled.

APPENDIX B

Annex A - Rationale

RATIONALE. Degradation of vehicle mission or mission readiness results in reduction of unit effectiveness. The purpose of the CPK is to improve unit effectiveness by increasing crew survivability. Therefore, CPK design must consider all aspects of vehicle mission and mission readiness. The design must keep vehicle mission and mission readiness degradation to an absolute minimum.

(c) Quantitative Reliability, Availability, and Maintainability (RAM) requirements are not appropriate for the CPK.

Rationale. TRADOC'S Combat Developments Engineering Division approved RAM Rationale for the CPK, dated 11 Apr 94, stated quantitative RAM requirements are not appropriate for CPK.

(2) Vehicle Payload. The CPK design shall minimize impact on vehicle payload. Any reduction of vehicle payload shall be well documented in the operator's handbook. When reduction in payload is absolutely unavoidable, work around operating procedures will be developed where possible. Such procedures may include slower speeds, etc. to permit as close to normal operations as possible with the CPK installed.

RATIONALE. CPK may reduce vehicle payload. However, impact must be minimum so vehicle can perform its mission.

(3) Vehicle Mounted Kits and Equipment. The CPK design shall permit operation of vehicle mounted kits and equipment as closely as possible to standard procedures.

Rationale. Mission essential vehicle mounted equipment, such as winch kit, arctic kit, NBC alarm kit, radios, cranes, wrecker booms, lifting and tiedown provisions, must be operable with installed CPK.

(4) Mobility and Tractive Effort. The installed CPK shall have minimal impact on mobility and tractive effort of the vehicle-:, Design of underbody blast protection system shall minimize reduction of ground clearance.

Rationale. The CPK impact on mission performance must be minimal.

(5) Maintenance Requirements.

(a) Neither the CPK nor the vehicle to which it is attached shall be adversely affected by operation of vehicle over the full vehicle operational mode summary/mission profile in climatic areas of the world in which the vehicle was designed to operate.

(b) The CPK operator PMCS requirements shall be limited to inspection and tightening of mounting fasteners. The design shall reduce these requirements to no more than an average of ten minutes (five minutes desired) per day addition to the normal vehicle PMCS conducted by the vehicle crew using tools found in the vehicle BII.

(c) The CPK design shall be maintenance free above crew level. Required maintenance shall be limited to removal and replacement of battle damaged parts at organizational level. No special tools or skills shall be required.

RATIONALE. Once attached to the vehicle, the CPK must withstand vibrations induced by the vehicle traversing rough terrain, as well as shock induced by ballistic impacts. The CPK must with stand climatic conditions, such as moisture, heat, and cold. There will be no additional maintenance personnel or equipment fielded with the CPK. Therefore, it is essential that CPK have minimal effect on unit and direct support maintenance.

(6) Battle Damage Repair (BDR). Easily replaceable components shall enhance CPK readiness during combat operations. Most BDR shall take place at organizational level by removing and replacing damaged parts. By design, mounting provisions shall be protected by the parts they support. Mounting provisions that must be welded to the vehicle shall be kept to a minimum to reduce necessity for evacuating vehicle to supporting maintenance for replacement.

RATIONALE. The CPK is required to protect the crew against mines small arms fire, and mortar/artillery fire. Parts of the CPK may become damaged when protecting the crew. Unit maintenance personnel must be able to restore the protection capability of CPK as quickly as possible using organic tools and equipment to permit subsequent vehicle missions in a timely fashion. Some damage, such as severe mine blast, may require higher echelon maintenance, if repairable.

(7) Parts Interchangeability. The CPK parts shall be interchangeable among vehicle types to the greatest extent possible. The connecting devices should be interchangeable as a minimum.

RATIONALE. Increased commonality of parts will reduce cost and improve sustainability. Commonality permits reduction of production costs, reduces ASL/PLL requirements, and simplifies Army maintenance systems;.

c. Critical System Characteristics.

(1) Vehicle Transportability. The installed CPK shall not degrade inherent vehicle transportability. Removal of some CPK parts may be necessary before shipment to meet this requirement.

(a) Preparation Time. Total additional time at the port to prepare a vehicle with installed CPK for shipment/use shall not exceed 15 minutes by a vehicle crew using BII tools. The operator handbook shall identify items that must be removed prior to reaching the port and then reinstalled at the unit maintenance facility once the vehicle arrives in country. This includes such items as the weapons station protection kit that require heavy lift equipment for removal, and items that must be removed to ensure proper axle loads.

RATIONALE. Preparation for shipment and use after must be by the vehicle crew using BII tools. Time spent at the port preparing the CPK for shipment or use after shipment is critical and must not delay movement of the vehicle through the port. Due to weight and size, some items, such as the weapons station protection kit, may have to be removed prior to movement to the port and reinstalled at a maintenance facility once the vehicle arrives in country. These items must be identified in the operator handbook to assist planning prior to the move.

(b) Parts Stowage. The CPK design shall provide stowage for parts that must be removed upon arrival at the port for vehicle shipment. The CPK parts shall be stowed within the allowable space envelope of the vehicle prepared for shipment. Requirements for shipment of CPK components that must be removed before arrival at the port shall be identified in the operator handbook.

RATIONALE. Stowage space on board vehicles ready for shipment is limited. Therefore, parts removed at the port must be secured elsewhere on the CPK for example, if a panel must be removed to permit access to a lifting provision, the panel should remain attached to the CPK. Identification of items to be removed prior to moving the vehicle to the port is necessary to permit planning for adequate shipping of the CPK parts.

(2) Nuclear, Biological, and Chemical (NBC) Contamination Survivability. According to Army Regulation (AR) 70-71 and DA Approved Quantitative NBC Contamination Survivability Criteria dated 12 Aug 91, armor plate, if used, will be coated with chemical agent resistant coating, or its state-of-the-art equivalent. This provides protection against the effects of chemical agent contamination and later use of decontaminating solutions. The CPK shall be decontaminable, hardened to the effects of decontaminates, and compatible for use with mission oriented protective posture (MOPP) IV. The design of all CPK components and spare parts shall consider ease of decontamination.

APPENDIX B

Annex A - Rationale

RATIONALE. To follow current regulations to ensure equipment not physically damaged is usable after decontamination following an NBC operation. Also to ensure the process can be accomplished by soldiers working in protective clothing.

(3) Nuclear Survivability. The CPK shall not degrade the survivability of the host vehicle to high-altitude electromagnetic pulse (HEMP).

RATIONALE. The addition of armor could compromise the HEMP survivability of the vehicle depending on how it is attached.

(4) Natural Environmental Factors. The CPK, when mounted, will operate within the basic vehicle's required environmental extremes and will not degrade the vehicle's ability to operate within these extremes. As a general rule, that includes all areas of the world having cold, basic, and hot climates (-50 to +120 degrees F.) and high humidity to dry, as defined in AR 70-38.

RATIONALE. The climatic conditions in which the vehicle operates must not effect the degree of protection provided by the CPK and that the CPK must not degrade the operation of the vehicle in these climatic condition.

(5) Vehicle RAM. The CPK shall have negligible impact on the inherent RAM characteristics of vehicles on which it is installed.

RATIONALE. There will be no increase of maintenance personnel as a result of fielding the CPK. The CPK design must not increase inherent vehicle maintenance requirements.

(6) Installation.

(a) Initial installation of the kit may require some direct support maintenance (organizational maintenance desired) to modify the vehicle by installing mounting provisions.

(b) Installation of the CPK protective parts on a modified vehicle shall be done at organizational level maintenance using assigned tools, equipment, and personnel. No welding shall be required.

RATIONALE. To enable the CPK application at the lowest possible level in event higher level maintenance is not available. Also to ensure that special lifting equipment is not necessary for installation/removal.

APPENDIX B

Annex A - Rationale

(7) Storage. The CPK shall be stored for extended periods of time without adverse effects from weather, humidity, temperature, or sunlight in hot, basic, and cold climates as defined in AR 70-38.

RATIONALE. The CPK will not likely be installed in peacetime, except for brief training periods. Available storage space in some unit locations may be limited. Therefore, the CPK may not always be stored under the most ideal conditions. It must be fully capable of maximum crew protection upon installation after extended periods of storage under adverse conditions.

APPENDIX B

Annex B - Operational Mode Summary/Mission Profile (OMS/MP)

1. Operational Mode Summary--Wartime/Peacetime

a. The TWVs employing the CPK will operate worldwide over varying types of terrain in all climatic design types. The CPK will be used in operations other than war as well as wartime. Combat, combat support and combat service support vehicles may employ the CPK. The CPK will be installed on the vehicle before deployment and may remain on the vehicle for the duration of the operation. The kit will not remain on the vehicle in peace time except for limited training periods.

b. The CPK will be installed on vehicles as they perform their designated mission as described in their respective requirement documents. The CPK will have minimum impact on the ability of the vehicle to perform its mission. Vehicle speeds across various terrain will remain approximately the same. Some mobility and transportability characteristics may be changed when the complete kit is installed. Terrain and speed profiles for the various tactical wheeled vehicles expected to use the CPK are given in their respective requirement documents.

2. Mission Profile - Wartime

When installed, the CPK becomes a component of the vehicle and will accompany the vehicle on its mission. The CPK will not require any adjustments, removal, or any other operator action. The kit is installed on the vehicle and remains in place during the entire mission. The CPK contains no moving parts and routine removal/reinstallation will not be required.

APPENDIX B

Annex C - Coordination Annex Of The
Operational Requirements Document (ORD)
For The Tactical Wheeled Vehicle (TWV)
Crew Protection Kit (CPK)

AGENCY	CONCUR 4/0 COMMENTS	NONCONCUR	COMMENTS PROVIDED
HQDA ODCSLOG (DALO-SMT)	X		
TRADOC (ATOS)			2
(ATCD-SRE-E) .			1
(ATCD-G/SL/ATDO-A)			
USACAC (ATZL-GCL-T)	X		
USAADAS (ATSA-CDM-L)	X		
USAARMS (ATSB-CD)			2
USACMS (ATZN-CM-CS)	X		
USAES (ATSE-CDM)	X		
USAFAS (ATSF-CSI-P)			5
USAINFS (ATSH-CDM-M)	X		
USAMPS (ATZN-MP-CM)	X		
USAQMS (ATSM-CDM)	1		
USASC&FG (ATZH-CDM)	X		
TACOM (AMSTA-CH-EH)			4
PEO-TWV (SFAE-TWV-P)			11
PEO-ASM (SFAE-ASM-SS-T)			8
TARDEC (AMSTA-RSK/RSS)			7
ATCOM (AMCPM-PWL)	X		
CECOM (AMSEL-RD-AS-AR)			9
MICOM (AMSMI-RD-ST)			7
USANCA (MONA-CM/NU)	X		
USAMSAA (AMXSY-SA)			8
USACSTA (STEES-LI)			1
USARL (AMSRL-SL-BS)			3
OPTEC (CSTE-ECS)			17
TEXCOM (CSTE-TMA)	X		
USAMDC&S (HSMC-FCM)			1

APPENDIX B

Annex C - Coordination Annex Of The
Operational Requirements Document (ORD)
For The Tactical Wheeled Vehicle (TWV)
Crew Protection Kit (CPK)

The following activities were sent a coordination copy-of the ORD and did not respond. Those marked with * sent a representative to one or more of the Joint Working Group Meetings and subsequent planning meetings.

* HQDA, ODCSOPS (DAMO-FDL)
* TRADOC (ATCD-B)
TRADOC (ATAN-ZC/ATBO-SO/ATCD-M/ATFE/ATTG-L)
CASCOM (ATCL-MR).
USATSC (ATIC-DMC)
USAAVNC (ATZQ-CDM)
USAALS (ATSPQ-CD/CMT)
USAHSC (HSAG/HSC-LO/HSHA-CDM)
USAISC (ATSI-CD)
* USAOC&S (ATSL-CD)
USAOMMCS (ATSK-CM)
MOUNTED WARFIGHTING BATTLE LAB (ATZK-MW)
TSM-CATT (ATZK-SM)
* USMC LNO (ATZK-CDL)
HEL LNO (SLCHE-FK)
USAAMC (AMC-CSC)
TECOM (AMSTE-TA-G/V/W/TE-I)
* NIGHT VISION AND ELECTRONIC SENSORS
(AMSEL-RD-NV/AMSRL-SL-IO)
* USABRDEC (SATBE-NAV)
* PM, Mines, Countermines, and Demolitions
USAMC-MRSA (AMSM-AM)
FORSCOM (FCJ3-FC)
USAREUR & 7TH ARMY (ODCSOPS)
MTMCTEA (MTT-TV)
USMC MAFTVWC (MCCDC)
STRICOM

APPENDIX B

Aannex D - Funding Implications

Program Resources - Cost Track Summary
(Dollars in Millions)
As of Date: Nov 95

(Constant Fiscal Year 95 Base Year $8)

	Planning Estimate $	Current Estimate $
Development Phase		
RDT&E		106.97
Total Development Phase		106.97
Production and Deployment		
Phase Procurement		218.84
Total Procurement		218.84
Total Sustainment Operating and Support (O&S) Phases		
Operation and Maint. Acct.		TBD
Total Development and Procurement Cost		
Estimate		$325.81

Number of vehicles by system:

M939 (750)	HEMTT(450)
HET (50)	M915 (200)
PLS (50)	FMTV (500)

HMMWV(2325) Only one variant of the HMMWV

APPENDIX C

EXHIBIT C
HEAVY EXPANDED MOBILITY TACTICAL TRUCK

APPENDIX H

FAILURE DEFINITION & SCORING CRITERIA

FOR

10 TON - HEAVY EXPANDED MOBILITY TACTICAL TRUCK (HEMTT)

JUNE 1980

Proponent Agency
RAM Engineering Division
Product Assurance Directorate
US Army Tank-Automotive Research Development Command, Warren, MI

APPENDIX C

HEAVY EXPANDED MOBILITY TACTICAL TRUCK
APPENDIX H

10 TON HEAVY EXPANDED MOBILITY TACTICAL TRUCK (HEMTT)
Failure Definition & Scoring Criteria

Section 1 Introduction

1.1 Purpose: This document sets forth the policies and procedures, and coordination between DARCOM and TRADOC, to assure a complete system assessment during test, and consistent determination of scheduled maintenance, unscheduled maintenance, system failures, and mission failures so that RAM characteristics and the logistics burden for the 10 Ton HEMTT vehicle may be established.

1.2 References:

AR 702-3, Army Materiel RAM, (15 Nov 76).

1.3 Background: Per 3,R 702-3, the combat developer and materiel developer will jointly develop and formally approve the failure definition and scoring criteria (FD/SC) to provide the basis for determining the RAM characteristics during testing. In addition, the operational and developmental testers, evaluators and logisticians will review and comment or. the FD/SC as to the realism and feasibility of the statements contained in the document.

1.4 Objective: To provide Consistent criteria for assessing RAM characteristics of the vehicle system that can be utilized throughout the vehicle's life cycle.

1.5 Scope: This document provides the Definitions and Scoring Criteria which will be used by all responsible elements concerned with the quantitative measurement of RAM values. The guidance provided in this document will be utilized throughout development and operational testing (DT/O:) and also provide the baseline for the analysis and utilization of field data.

1.6 Policies: a. The system reliability (MMBF) will be analyzed in accordance with the procedures reflected herein and assessed with respect to the reliability requirement baseline to be contained in tile vehicle requirements documents. Mission reliability will be calculated for use in the user Independent Evaluation Report (IEP).

b. Joint DARCOM/TRADOC scoring conferences will be held to conduct a total assessment of all test incidents, using the scoring criteria contained herein. This assessment and the quantitative measurement of RAM levels achieved against the defined requirements will be reported to essential points of authority.

c. The minimum elements of information to be collected during testing are defined in Appendix C. These elements will provide the essential information to perform an adequate evaluation/assessment of the RAM characteristics and performance. Specific elements of Information to be collected for OT testing are identified in the Test Plan.

d. The maintenance burden will be jointly assessed by DARCOM and TRADOC proponents to provide an estimate of total maintenance impact.

e. The scoring criteria contained herein consists of guidelines for consistent classification of test incidents.

(1) Guidelines for classification and scoring of test incidents are in Appendices A and B.

(2) Tactical mission essential functions:

(a) Mission essential functions required to preclude a mission abort are prescribed through a functional block diagram in Appendix D, which shows the functions essential for mission performance.

1.7 Procedures:

a. The measurement of RAM characteristics will begin when test results become available utilizing the scoring criteria contained herein. The test agency personnel assign the initial classification of each test incident. Scoring conferences will be conducted at mutually agreeable points in the test program, to establish coordinated DARCOM/TRADOC incident classifications.

b. As testing progresses, the analysis of the test data and the subsequent decisions made to scoring conferences will be recorded and used to assure that consistent scoring decisions are made throughout the testing program for each system.

2. Failure Definition: The jointly developed and approved failure definition is the responsibility of the combat developer and the materiel developer. For each Tank-Automotive System engineering development, the following general failure definitions will ensure a consistent data base for the vehicle systems from which technological forecasts and RAM-D requirements analyses for future systems and components may be developed.

a. System Failures - See para 2.5.1, Appendix A.

b. Mission Failure - See para 2.5.2, Appendix A.

c. Durability Failure - See para 2.5.3, Appendix A.

APPENDIX C

HEAVY-EXPANDED MOBILITY TACTICAL TRUCK
APPENDIX A OF APPENDIX H
GUIDELINES FOR CLASSIFICATION OF TEST INCIDENTS

1. Application: These guidelines are to be used to classify test incidents under the following categories: No test, no failure, unscheduled and scheduled maintenance, system failures, and tactical mission failures. The impact of equipment failures is reduced through the planned maintenance and servicing which is developed prior to the test. It is necessary, therefore, to distinguish between test incidents resulting from programmed maintenance and test incidents requiring unprogrammed maintenance. It is not possible to have hard rules for evaluating all incidents, therefore, Judgment will have to be exercised in the classification of sane incidents.

2. Scoring Criteria: In order to provide for accurate and timely maintenance incidents for both test and operational data, the following generalized incident classification categories are provided. The use of these categories will provide a common data baseline for the Tank-Automotive System and its components and permit technological forecasting and accurate determination of RAM-D attribute needs in future Tank-Automotive Systems and components.

2.1. No Test. Incidents which are not counted as maintenance actions or as failures are to be placed in this category. The “no test" category will include such things as test item abuses, unrealistic operating conditions, accidents, operator or maintenance error, modifications, kit installations, or maintenance/engineering evaluations.

2.2. No Failure. Incidents which require unscheduled maintenance action but which are not to be counted as system failures or mission failures fall into this category. The “no failure” category covers such test interruptive incidents as:

a. Actual or incipient malfunctions for which corrective action is authorized or prescribed as an operator/crew function and can be accomplished within. 30 minutes using only controls, OEM tools, and spare parts incorporated in or carried with the system.

b. Actual or incipient malfunctions, detected during operations, that can be deterred for the remainder of its specified life before overhaul, replacement, rebuild or salvage (as applicable), or until the next scheduled maintenance that is prescribed for the level authorized

for correction.

c. Incipient malfunctions o: the system detected during prescribed inspections connected with a scheduled maintenance unless higher level maintenance is prescribed for the corrective action.

d. Actual or incipient malfunctions resulting from not following the prescribed operational or maintenance procedures dictated by the equipment manuals or which can be directly attributed to improper replacement of components or omission of prescribed scheduled service or inspections. This does not apply if the malfunction is attributed to improper design of the test item, error in the operator/maintenance manuals, or inadequacy of any other element of the maintenance test package.

e. Actual or incipient malfunctions resulting from test item abuse, unrealistic operating conditions, non-valid test or accident.

f. The incident was caused by another incident (i.e., secondary failure).

g. A malfunction which may be overcome by the use of a redundant mode which provides equivalent and/or satisfactory performance, the correction of which can be deferred for the remainder of its specified life before overhaul, replacement, rebuild or salvage (as applicable), or until the next scheduled maintenance that is prescribed for the level authorized for correction.

h. Actual or incipient malfunctions subsequently traced to a common and predictable failure mode which is positively isolated, corrected by modification, and verified by test.

i. Malfunctions deferred to and/or corrected during the final technical inspection, except for those which would have previously been considered a system failure if an attempt had been made to operate the affected subsystem prior to final inspection.

2.3. Scheduled Maintenance: A scheduled maintenance action is any test incident which results from actions programmed to occur, such as servicing and scheduled replacement of components as specified in the maintenance documents.

2.4. Unscheduled Maintenance: An unscheduled maintenance action is any test incident which is not scheduled as defined in para 2.3. above.

2.5. Failures:

2.5.1. System Failures:

a. A system failure is defined as any actual or incipient malfunction of the vehicle that required diagnostic or corrective action which could not have been deferred:

(1) Until the next scheduled maintenance (exclusive of lubrication services), if organizational maintenance is prescribed for correction or:

(2) For the remainder of its specified life before overhaul, replacement, rebuild, or salvage (as applicable).

b. Diagnostic and/or corrective action is not considered deferrable if the malfunction caused (or would have caused if not corrected, i.e., incipient malfunction):

(1) Inability to commence operation, cessation of operation, or reduction in performance capability to the extent that a prescribed or system function is either lost or significantly degraded, or:

(2) A critical or catastrophic hazard to personnel or equipment as defined by MIL-STD-882A (28 June 1977).

c: Amplification:

(1) Prescribed organizational level corrective actions deferrable to the scheduled maintenance are to be accomplished without charging a system failure. Incipient malfunctions of the end item detected during prescribed inspections connected with the scheduled maintenance will also be corrected without charging a system failure unless higher level maintenance is prescribed for the corrective action. In this event, a system failure will be charged if the corrective action is not deferrable to the next scheduled maintenance at that level. A system failure will also be charged if a malfunction of a subsystem of the end item was detected during the scheduled maintenance that would have been previously considered a system failure of the end item if an attempt had been made to operate the affected subsystem prior to the scheduled maintenance.

(2) If an incipient malfunction of the end item was detected during the correction of another malfunction, two system failures will be charged provided that: The malfunctions were totally unrelated, maintenance was performed to prevent progression of the incipient malfunction, and both malfunctions comply with the above stated definition of “system failure”. However, if the malfunctions were related (e.g., secondary damage caused by primary component malfunction) only the primary malfunction will be considered a system failure.

(3) When the occurrence of more than one actual malfunction is subsequently traced to a common cause which is positively isolated, corrected by maintenance action and verified, only one malfunction in the series will be scored as a system failure (if otherwise qualified). Diagnostic sad unscheduled maintenance time associated with all of the malfunctions will be chargeable.

(4) Extract of MIL-STD-882A: MIL-STD-882A System Safety Program Requirements, dated 28 June 1977, provides uniform requirements and criteria for establishing and implementing system safety programs. Under para 5.4.3.1, hazard severity is defined as fol1ows:

Hazard Severity: Hazard severity categories are defined to provide a qualitative measure of the worst potential consequences resulting from personnel error, environmental conditions, design inadequacies, procedural deficiencies, system, subsystem or component failure or malfunction as follows:

(a) Category I - Catastrophic: May cause death or system loss.

(b) Category II - Critical: may cause severe injury, severe occupational illness, or major system damage.

(c) Category III: - Marginal: May cause major injury, minor occupational illness, or minor system damage.

(d) Category IV - Negligible: -Negligible will not result in injury, occupational illness, or system damage.

(5) These hazard severity categories provide guidance to a wide variety of programs. However, adaptation to the 10 Ton Extended Mobility Vehicle Program is required. This adaptation may include definite transition points between categories and further definition of injury or damage. Examples of each category are:

(a) Category I - Catastrophic: Rupture of fuel or brake line.

(5) Category II - Critical: Failures which result in excessive CO concentration.

(c) Category III - Marginal: Loss of coolant, may deteriorate to Category II.

(d) Category IV - Negligible: Loss of panel indicators (instruments).

2.5.2. Mission Failure. -A mission failure is any incident which results in the inability to begin or complete a prescribed mission, degrades mission performance or presents a critical or catastrophic hazard to personnel or equipment as defined by MIL-STD-882A (28 June 1977). Prescribed mission profile will be defined by TRADOC, and provided to the tester.

2.5.3. Durability Failures: A system or major component durability failure will be considered to have occurred when the failure results in a condition requiring replacement or overhaul of the system or major component prior to the specified scheduled overhaul cycle.

a. System Level Conditional Overhaul: For the system level, a durability failure will be categorized if the failure is beyond the limits of General Support Maintenance. Generally the overhaul at the system level will be conditional. For example, the conditional overhaul of a tactical vehicle would have occurred if the chassis and/or cargo structural members suffers a severe crack or distortion.

b. Major Component Durability: For major components, a durability failure will be charged when any malfunction occurs which results in a condition requiring unscheduled replacement or overhaul of the specified components prior to the specified overhaul cycle. Replacement or overhaul will be considered to have happened if the repair of the specified major components is beyond the capabilities of organizational or direct support maintenance level as designated by the Maintenance Allocation Chart. Durability failures can occur in major components on the basis of part failure and/or performance degradation below a previously designated level.

3. Incident Scoring Flow Chart: As each test incident is reviewed a score will be assigned. The scoring logic and values are described in the Scoring Decision Flow Chart which is presented in Appendix B.

4. Periodic Review: For the purpose of determining the RAM characteristics, the original scoring of incidents will be subjected to periodic review predicated on institution of corrective actions. The basis for eliminating failures or maintenance time in order to arrive at the adjusted values will be scoring conference consensus that a given modification was satisfactory and therefore would have either precluded the failure (or maintenance time) or substantially reduced the failure rate for the component.

APPENDIX C

APPENDIX B OF APPENDIX H
DECISION FLOW CHART

STEP	GUIDELINES		FAILURE CATEGORY	REMARKS
1.	Does incident concern RAM-D?	NO	No Test (Information Only)	These will include suggested improvements, test procedures, extraneous test information.
		YES		
2.	Was incident detected during initial/final inspection?	YES	No Test (Information Only)	Quality failures/problems. Problems discovered prior to start of test. Shipping damage, etc.
		NO		
3.	Did incident result from test item abuse, unrealistic operating conditions, accident, or failure to follow maintenance procedures?	YES	No Test (Information Only)	Incidents will be assessed for man/machine interface problems.
		NO		
4.	Was the incident a kit installation authorized modification?	YES	No Test (Information Only)	
		NO		
5.	Was the incident a scheduled replacement or service of parts before failure?	YES	No Failure (Scheduled Maintenance)	Does not include malfunctions detected during scheduled maintenance.
		NO		

APPENDIX C

APPENDIX B OF APPENDIX H
DECISION FLOW CHART

STEP	GUIDELINES		FAILURE CATEGORY	REMARKS
6.	Was the incident caused by improper/ insufficient maintenance/operator instructions or any other element of maintenance test support package?	YES	Unscheduled Maintenance and may may not be a system and/or Mission Failure.	Assessed for changes to MTSP, e.g. instructions, parts, tools, etc.
	NO			
7.	Was the incident caused by an incipient malfunction detected during scheduled maintenance or detected during operations for which correction can be deferred to a scheduled maintenance and corrected at that level?	YES	No Failure (Unscheduled Maintenance	Unprogrammed action.
	NO			
8.	Was incident an actual malfunction for which maintenance can be deferred to the next scheduled maintenance and corrected at that level or deferred to end of test?	YES	No Failure (Unscheduled Maintenance)	Incident would not cause degradation of system performance.
	NO			

APPENDIX C

APPENDIX B OF APPENDIX H
DECISION FLOW CHART

STEP	GUIDELINES		FAILURE CATEGORY	REMARKS
9.	Was incident the result of another incident?	YES	No Failure (Unscheduled Maintenance)	Secondary malfunctions contribute to maintenance times only.
	NO			
10.	Could incident have been corrected within 30 min by operator/ crew using OEM tools, spare parts?	YES	No Failure (Unscheduled Maintenance)	Authorized or prescribed operator/crew function only except tires. One hour is allowed for tire changing.
	NO			
11.	Could mission be completed without safety hazard or loss of degradation of any mission essential function?	YES	System Failure (Unscheduled Maintenance)	
	NO			
12.	Would incident present critical or catastrophic hazard to crew or equipment?	NO	Unscheduled Maintenance * System Failure * Mission Failure	MIL-STD-882A Category I and II.
	YES		Unscheduled Maintenance * System Failure Mission failure Criticality Factor Of 1.00	

APPENDIX C

HEAVY EXPANDED MOBILITY TACTICAL TRUCK
APPENDIX C OF APPENDIX H

Data Requirements: The minimum data listed below will assure a homogenous database for RAM-D assessment, growth, technological forecasting and the determination of requirements for future Tank-Automotive Systems and components.

1. Complete description of test incident and its mission effect to the extent necessary to allow a coordinated changeability classification.

2. Complete description of all hardware modifications incorporated during test (including identification and action on parts involved, reason for modification, ate.).

3. Complete system identification (Vehicle No., etc.).

4. Age of test item and system in miles, hours, rounds, and cycles, as applicable (all age information), at time of test incident.

5. Age of test item and system at star: and end of test in miles, hours, rounds, and/or cycles, as applicable (all age information) .

6. Date and time test incident occurred in the format of “Day, Month, Year, Time” e.g., 23 Oct 75 (1300 hr).

7. Location where test incident occurred/was detected; e.g., APG paved track #2, YPG tank gravel course, shop etc.

8. major subsystem identification (engine, suspension, weapon station, etc.).

9. Test item identification (nomenclature, FSN, standard government group) .

10. Effect of teat incident on the completion of the next general mission.

11. Maintenance actions(s) taken as a result o= the test incident.(adjusted, replaced, none, etc.).

12. Time required in manhours and clockhours to perform each scheduled and unscheduled maintenance action.

a. Active maintenance Time
b. Diagnostic Maintenance Time
c. Total out of Service Time

13. Number of men, MOS, and level of maintenance required to perform scheduled and unscheduled maintenance services.

14. Initial scoring per specified Failure Definition and Scoring Criteria, and rationale as required.

APPENDIX D

PALLETIZED LOADING SYSTEM

FAILURE DEFINITION AND SCORING CRITERIA
MAY 1989

a. Introduction: This paragraph contains the failure definition and scoring criteria for establishing an agreed upon database. The data base will be used for making reliability and maintainability assessments for evaluation of CFE and GFE. All test incidents will be scored using the guidelines in paragraph c.

b. Mission Essential Functions.

(1) One of the key elements in the operational RAM concept is the section of the FD/SC called mission essential functions. Mission essential functions are the minimum operational tasks which the system must be capable of performing to successfully complete its missions. The purpose of clearly describing the mission essential functions is to allow application of the failure definition which references the mission essential functions to the test data. The loss of any mission essential function regardless of when it occurs will be scored as an operational mission failure. Since the intent is to address operational RAM rather than hardware RAM, the mission essential functions must be described in simple operational terms instead of being related to the design of the hardware.

(2) The heavy truck has three mission essential functions. They are: Move, Transport, Self Load/Unload under conditions as specified in the OMS/MP. An actual or incipient malfunction which would result in the inability to perform one or more mission essential functions) to a level less than that described below will be charged as an operational mission failure.

(a) Move-function. The mobility system must be capable of effectively maneuvering such that the system can maintain its assigned position within a tactical convoy and to complete a round trip transport mission. In order to carry out the convoy or transport tasks, the vehicle must be able to:

1. Begin operation without outside assistance.

2. Maneuver by steering so as to be functionally and safely controllable by the operator on roads, trails, and cross-country terrains.

3. Maneuver by moving forwards and backwards.

4. Move with sufficient speed and power to maintain the average speeds specified in the mission profile over the indicated terrain and grades (Determined by the operator's observation of the vehicle speedometer and/or tachograph to within 20 percent of the specified speeds.)

(b) Transport Function. The vehicle must be capable of carrying military cargo up to and including the 16.5 ton payload limit.

(c) Self Load/Unload Function. The vehicle and LHS must be capable of loading and unloading the load racks up to and including the 16.5 ton payload limit using vehicle power only.

(3) The Trailer has three mission essential functions. They are move, transport, to be loaded/unloaded under conditions specified in the OMS/MP. An actual or incipient malfunction which would result in the inability to perform one or more mission essential function to a level less than that described below will be charged as an operational mission failure.

(a) Move Function. The mobility system must be capable of effectively maneuvering such that the system can maintain its position behind the towing vehicle. In order to carry out the tasks the trailer must be able to:

1. Maneuver when towed so as to be functionally and safely controllable by the operator on primary and secondary roads, trails, and rough trails.

2. Maneuver by moving forward and backwards with towing vehicle.

3. Move with sufficient speeds so towing vehicle can maintain the average speeds specified in the mission profile over the indicated terrain and grades. (Determined by the operator's observation of the vehicle speedometer and/or tachograph to within 20 percent of the specified speeds.)

(b) Transport Function. The trailer must be capable of carrying standard military cargo up to the 16.5 ton payload limit.

(c) Load/Unload Function. The trailer must be capable of being loaded/unloaded with racks up to and including the 16.5 ton payload limit using towing vehicle power only.

(4) The Material Handling Crane has two mission essential functions. They are to provide lift and position the load. An actual or incipient malfunction which would result in the inability to perform one or more mission essential functions to a level less than that described below will be charged as an operational mission failure.

(a) Provide Lift Function. The Material Handling Crane must have the capability of lifting a 3900 lb pallet from any location on a flatrack positioned on the prime mover, holding that weight, and lowering it while maintaining control of that weight at all times. Operation of the crane must begin without outside assistance.

(b) Provide Position Function. The Material Handling Crane must have the capability of articulating at least 180 degrees, picking up from any location on the flatrack, and operate at any location on the flatrack.

c. Classification/Chargeability Guidelines. for PLS

(1) Outline. The process of scoring test incidents is divided into two parts. The first part is the classification of the test incident based upon the failure definition. Classification is a categorization of the effect of the incident. The classification is made without regard to who or what caused the incident or when it occurred. The classification procedures are covered in steps 1 thru 6 of paragraph c. (3)(a) thru c. (3)(f). The second part of the scoring process is the assignment of chargeability for all test incidents. The chargeability step assigns the primary cause for the occurrence of the incident to one of seven operational elements. Once chargeability has been determined the appropriate agency will be assigned the responsibility for the corrective action. Figure 3-1 contains the classification/chargeability flow chart. Chargeability is covered in step c. (3)(g).

(2) Generalized Operational Mission Failure Definition. An operational mission failure is any incident or malfunction of the system which caused of could have caused the inability to perform one or more mission essential functions or is a critical or catastrophic hazard to personnel or equipment.

(3) Classification/Chargeability Flow Chart Expansion. (See figure 3-1).

(a) STEP 1 - NO TEST

1. Question: Is the incident a "NO TEST"

2. Procedure: If the answer is "NO" proceed directly to STEP 2. If the answer is "YES" score the incident as STEP 1, then stop.

3. Expansion: The "NO TEST" category includes the following:

(a) Pretest Checkout. This includes an initial road test and "burn-in" of components. The test plan must specify the number of miles, hours, etc., for the pretest "burn-in". Incidents occurring during this period are scored as "NO TEST". All incidents detected after the initial inspection period will be scored on their own merits under succeeding steps.

(b) Equipment Modification. This includes all maintenance actions involved in the installation of hardware kits or incorporation of redesigned components. If the replaced component was not functioning at the time of its replacement with the modification, the incident will be scored on its own merit. The maintenance time will be estimated based on the time to restore the system to its original condition. Subsequent malfunctions of the modification will be scored on their own merit.

(c) Test Peculiar. Malfunctions caused by non-system equipment or people not acting as crew or maintenance personnel are scored as "NO TEST". Engineering evaluations to analyze the cause of malfunctions as well as any malfunctions and/or maintenance efforts caused by the engineering evaluation are scored as *NO TEST". This also includes maintenance evaluations conducted as a part of the test plan and malfunctions to or caused by test peculiar instrumentation. Incidents caused by contractor or other personnel acting as crew or maintenance personnel will be scored under their own merit under succeeding steps.

(d) Flatrack Related. This includes all incidents which were due directly to the flatrack itself and not caused by the PLS version, hydraulic mechanisms, and/or mounting devices integral to the PLS version. All incidents under this step will be scored as a "NO TEST" to the PLS version and a chargeability element will be assigned to be evaluated against the flatrack only. Clock time and maintenance man time for system maintenance by level and MOS will be recorded but not charged against the PLS version. The chargeability elements for the flatrack are as follows:

1. Chargeable to the hardware (CH). This incident is due to design inadequacy and includes personnel related Incidents that are attributable to characteristics of the hardware design which results in a fracture or deformation of the flatrack base, supporting members, pick-up points, loading points of contact or securing or tiedown mechanisms integral to the flatrack for securing the flatrack to the PLS version which severely limits or prohibits loading, securing or unsecuring, or deploying of a flatrack.

2. Chargeable to crew (CC).

3. Chargeable to maintenance personnel (CMP).

4. Chargeable to manuals (CM). This includes personnel related incidents that are attributable to misleading, incorrect, or missing information.

5. Chargeable to support equipment (CSE). The support equipment includes special and common tools, spares, repair parts, associated software, etc.

6. Chargeable to accident (CA). This includes only accidents which cannot-be charged to one of the above elements; e.g., an accident caused by crew error would be charged as "CC".

e. Daily Checks and Services. This consists of preoperation, during operation, and postoperation checks and services performed by the crew as prescribed by the equipment publication which were completed within 15 minutes using only 2 quarts of petroleum, oils and lubricants (POL) and the on equipment material (OEM) tools. If these criteria are not met, the incident will be scored on its own merit under succeeding steps.

f. Deliberate Abuse. This includes willful abuse (e.g., performance capability limit test) whether it was prescribed by the test plan' or not. Abuse by crew or maintenance personnel will be scored on its own merit under succeeding steps.

g. Non-RAM Oriented. This step includes those events for which a test incident report might be initiated by the test activity, but which are not incidents used in RAM computations. Examples include suggested improvements, reports of test procedure, unusable or unacceptable replacement parts which were discovered prior to installation, inability to meet performance specifications where no malfunction has occurred, and suggested human factors improvements. Recommended changes to the system support package not related to a specific test incident are also covered by this step.

(b) STEP 2 - SCHEDULED MAINTENANCE ACTION (SMA)

1. Question: Was the incident a scheduled maintenance action

2. Procedure: If the answer is "NO", proceed directly to STEP 3. If the answer is "YES", classify incident as a "SCHEDULED MAINTENANCE ACTION" (SMA). It is necessary to record one removal for each spare used and record the clock time, maintenance man time and the repair pats used.

3. Expansion: Scheduled Maintenance Actions are programmed services and/or replacements performed at intervals defined by either calendar time or by usage (miles, hours, etc). Scheduled maintenance also covers those programmed replacements which are not usage related, but which are dictated by measured wear or deterioration (on condition maintenance such as replacement of tires). These actions must be prescribed by the equipment publications and must have sufficient latitude in their time of performance to permit them to be accomplished during a slack period between missions.

(c) STEP 3 - CREW CORRECTABLE MAINTENANCE ACTION (CCMA).

1. Question: Was the incident a malfunction which was corrected by the crew using only authorized tools, repair parts and spares found on board, and which was performed within 30 minutes

2. Procedure: If the answer is "NO", proceed directly to STEP 4. If the answer-is "YES", classify a "CCMA" and record one removal for each spare (i.e., repairable item) used. Record the clock time, maintenance man time, and repair parts used.

3. Expansion: STEP 3 covers those minor maintenance actions which may interrupt the mission, but which the crew can repair by "immediate action" and continue the mission. Crew "action" need not be maintenance, but may be simply rerunning the "beginning operations" procedures. In a test environment, there will usually be test peculiar analysis and diagnostic time associated with the action. Delete test peculiar time before scoring this incident. Allowable time must be consistent with mission requirements. The

time limit is the maximum downtime of a mission essential function which would not result in a serious impact on the effectiveness of the system. A spare is defined as "those support items that are coded as repairable (i.e., repairable items)." A repair part is defined as "those support items that are coded as not repairable (e.g., consumable items)." Any crew correctable maintenance time will not be charged against the Maintenance Ratio Requirement.

(d) STEP 4 - UNSCHEDULED MAINTENANCE ACTION (UMA)

1. Question: Was incident an actual malfunction for which maintenance can be deferred to the next scheduled maintenance and corrected at that level or deferred to end of test

2. Procedure: If the answer is "NO", proceed directly to STEP 5. If the answer is "YES", classify incident as a "UMA" before proceeding to STEP 7. It is necessary to record one removal for each spare used and record the clock time, maintenance man time, and the repair parts used.

- 3., Expansion: Th-e total time the item or component has been in service should be recorded and stated at the time that the item or component is replaced.

(e) STEP 5 - ESSENTIAL MAINTENANCE ACTION (EMA)

1. Question: Was the incident a-r unscheduled maintenance action that can be deferred until' the end of the -current mission because of no effect on a mission essential function and must be repaired prior to the start of the next mission

2. Procedure: If the answer is "NO", proceed directly to STEP 6. If the answer is "YES", classify as "EMAII and "UMA" and record one removal for each spare used. Record the clock time, maintenance man-time, and the repair parts used.

3. Expansion: Essential maintenance actions include all operational mission failures plus any additional unscheduled maintenance actions which require corrective action prior to starting the next mission (e.g., repair of a redundant mission essential component).

(f) STEP 6 - OPERATIONAL MISSION FAILURE (OMF)

1. Question: Did the incident cause or could it have caused either:

a. The inability to perform one or more of the mission essential functions to the degree specified in paragraph b

b. A critical or catastrophic hazard to personnel or equipment as defined by MIL-STD-882B, (ref. paragraph d).

2. Procedure: If the answer is "NO", proceed directly to STEP 1. If the answer is "YES", classify the incident as "OMF",

"EMA", and "UMA" then proceed to STEP 7. Record one removal for each spare used, record the clock time, maintenance man time, by level and Military Occupational Specialty (MOS) and repair parts used.

3: Expansion: A malfunction caused by another simultaneous malfunction is scored as one failure. The maintenance time will be the sum of the maintenance time for both incidents. An incipient malfunction whose repair is deferred to a scheduled maintenance period will be scored on its own merits.

(g) STEP 7 - IDENTIFICATION OF CHARGEABLE ELEMENTS

1. Question: What operational element was primarily responsible for the incident:

2. Procedure: Assign the test incident to one of the following categories:

a. CHARGEABLE TO HARDWARE (CH). This includes personnel related incidents that are attributable to characteristics of the hardware design.

b. CHARGEABLE TO CREW (CC).

c. CHARGEABLE TO MAINTENANCE PERSONNEL (CMP)

d. CHARGEABLE TO MANUALS (CM). This includes personnel related incidents that are attributable to misleading, incorrect, or missing information.

e. CHARGEABLE TO SUPPORT EQUIPMENT (CSE). The support equipment includes special and common tools, spares, repair parts, associated software, etc.

f. CHARGEABLE TO ACCIDENT (CA). This includes only accidents which cannot be c5arged to one of the above elements; e.g., an accident caused by a crew error would be charged as "CC".

3. Expansion: This step assigns chargeability to all incidents except the "NO TEST". Actual maintenance need not be performed in order to assign chargeability. During the stoning conference corrective action process, chargeability may be further broken out if necessary (e.g., Contractor Furnished Equipment (CFE), Government Furnished- Equipment (GF=)).

d. Extract of MIL-STD-882B. MIL-STD-882B, Requirements for System Safety Program for Systems and Associated Subsystems and Equipment, dated 30 March 1984, provides uniform requirements and criteria for establishing and implementing system safety programs. Under Section V, the work hazard severity is defined as follows:

Hazard severity categories are defined to provide a qualitative measure of the worst potential consequences resulting from personnel error, environmental conditions, design inadequacies, procedural

deficiencies, system, subsystem or component failure or malfunction as follows:

CATEGORY I -	CATASTROPHIC	May cause death or system loss.
CATEGORY II -	CRITICAL	May cause severe injury, severe occupational illness or major system damage.
CATEGORY III -	MARGINAL	May cause minor injury, minor occupational illness or system damage.
CATEGORY IV -	NEGLIGIBLE	Will not result in injury, occupational illness or system damage.

APPENDIX D

FIGURE 3-1
DECISION FLOW CHART

STEP	GUIDELINE		FAILURE CATEGORY	REMARKS
1a	Was incident detected during initial/final insp.	YES	NO TEST	Reference para c.(3)(a) 3. for Definition of pretest checkout and initial/final inspection.
	NO			
1b	Was incident a kit installation or an authorized MOD?	YES	NO TEST	If component being modified is found to be broken at the time of the modification, then the incident is scored on its own merit.
	NO			
1c	Was the incident an engring or maint evaluation or caused by test peculiar instrument-tation?	YES	NO TEST	
	NO			
1d	Was the incident due to the flatrack?	YES	NO TEST	Ref para (3)(a) 3.d for expan Assign to one of the following categories: CH - HARDWARE CC - CREW CORRECT CMP - MAINTENANCE CM - MANUALS CSE - SUPPORT EQUIP CA - ACCIDENT
	NO			
1e	Was the incident detected preoperation, operation crew checks & services. & minor preventive repairs/services/ adjustments which can be completed in less than 15 min by the operator/crew.	YES	NO TEST	Ref para (3)(a) 3.e for definition of preventive maint
	NO			
1f	Did incident result from deliberate test abuse?	YES	NO TEST	Ref para (3)(a) 3.f for definition of deliberate abuse.
	NO			
1g	Is the incident Non-RAM oriented?	YES	NO TEST	These will include suggested improvements, test procedures, extraneous test information. No impact on RAM-D.
	NO			

2.	Scheduled replacement/ Service	YES	SCHEDULED MAINTENANCE	Ref para (3)(b) for definition of scheduled maint. This step does not include actual or incipient malfunctions detected during scheduled maintenance.
	NO			
3.	Could incident have been corrected within 30 min by operator/crew using OEM tools, spare parts?	YES	CREW CORRECTABLE MAINTENANCE	Ref para (3)(c) for .definition of operator/crew correctable incident. Go to step 7 to determine incident chargeability.
	NO			
4.	Was the incident an actual malfuntion for which maint can be deferred to the next sched maint and corrected at that level or deferred to the end of the test?	YES	UNSCHEDULED MAINTENANCE	Ref para (3)(d) for definition of unscheduled actions. Go to step 7 to determine chargeability.
	NO			
5.	Was the incident an unsched maint action that can be deferred until the end of the current mission because of no effect on a mission essential-function?	YES	ESSENTIAL MAINT & UNSCHED MAINT ACTION	Ref para (3)(e) for a description of essential maint actions. Go to step 7 to determine chargeability.
	NO			
6.	Was the incident and actual intermittent or incipient malfunction which caused or could have caused the inability to safely perform the mission essential fuctions?	YES	OPERATIONAL MISSION FAILURE EMA & UMA	Ref para b. for description of the mission essential functions. Go to step 7 to determine incident chargeability
	NO			

7. What operational element was primarily responsible for the incident?

(USE ONLY WITH STEPS 3-6)

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Assign to incident one of the following categories:

- CH - HARDWARE
- CS - SOFTWARE
- CC - CREW
- CMP - MAINTENANCE
- CM - MANUALS
- CSE - SUPPORT EQUIPMENT
- CA - ACCIDENT

APPENDIX E

3.0 IMPROVED RIBBON BRIDGE (IRB) FAILURE DEFINITION AND SCORING CRITERIA (FDSC) REVISED FOR COMMON BRIDGE TRANSPORTER (CBT), IMPROVED BOAT CRADLE (IBC), and BRIDGE ADAPTER PALLET (BAP) TESTING (SEP 96)

3.1 INTRODUCTION.

a. This document contains a failure definition and scoring criteria for establishing an agreed upon data base. The data base will be used for making-operational reliability and maintainability assessments for evaluation of Contractor Furnished Equipment (CFE) and Government Furnished Equipment (GFE). All test incidents will be scored using guidelines in paragraphs 3.2 and 3.3. Figure 3-1 provides a flowchart summarizing the scoring process.

b. System Description. The Improved Ribbon Bridge (IRB) system consists of a transporter, launch/retrieve mechanism, interior bays, ramp bays and ribbon bridge erection boats shallow draft (BEB-SD). The transporter is a Heavy Expanded Mobility Tactical Truck (HEMTT) M977 chassis with a Palletized Load System (PLS) Load Handling System (LHS) installed allowing the truck to self load, unload, and transload various bridge pallets compatible with the NATO standard flatrack. The Bridge Adapter Pallet (BAP) and the Improved Boat Cradle (IBC) have been developed for the transport and deployment of the ribbon bridge bays (interior and ramp) and the BEB-SD, respectively. The M977 HEMMT will optionally tow the PLS M1076 trailer, depending on mission requirements. The system also has the capability of transloading a BEB-SD/IBC, Bay/BAP, or a flatrack from the transporter to the trailer, and visa versa. The flatrack provides an optional cargo carrying capability, as well as carrying Medium Girder Bridge (MGB) components. The flatrack is not considered part of the IRB system.

c. This document was updated from the June 1994 version as agreed upon at the 9 Aug 96 CBT scoring conference, held at Aberdeen Proving Ground, MD. The following changes were made to the FDSC:

(1) The acronym was changed from Improved Common Bridge Transporter (ICBT) to CBT.

(2) Transloading was added as a Mission Essential Function.

(3) The MEFs were modified to properly describe the functions of the IBC and SAP. The original IRB MEFs were added for completeness.

(4) A brief system description was added.

(5) Figures 3-1 (scoring worksheet) and 3-2 (scoring summary) were deleted. Figure 3-3 then becomes Figure 3-1.

3.2 MISSION ESSENTIAL FUNCTIONS:

a. Mission Essential Functions (MEFs) are the minimum operational tasks which the system must be capable of performing in order to successfully complete its missions. The operator should be able to readily identify the loss of a mission essential function during normal operations. The loss of any mission essential function, regardless of when it occurs will be scored as an operational mission failure (OMF). An OMF is any incident or malfunction (actual, intermittent, or incipient) of the system which caused or would have caused the inability to perform one or more of its MEFs or a critical or catastrophic hazard to personnel or equipment. Paragraph 3.4 describes critical and catastrophic failures in further detail.

b. The IRB system has the following MEFs:

(1) Must be able to transport its bridge components.

(2) Must be able to launch bridge components for a 100 meter bridge from a prepared dirt site.

(3) Must be able to assemble bridge components for a 100 meter bridge..

(4) Must be able to handle bridge crossings at the rate and volume specified in the OMS/MP.

(5) Must be' able to disassemble bridge components of a 100 meter bridge.

(6) Must be able to retrieve bridge components of a 100 meter bridge from a prepared dirt site.

c. The following MEFs were derived for the CBT system:

(1) Must be able to transport the bridge components (interior bay, ramp bay, BEB).

(2) Must be able to launch bridge components from a prepared site.

(3) Must be able to retrieve bridge components from a prepared site.

(4) Must be capable of transloading IBC, BAP, and PLS flatrack with payload to/from a PLS trailer.

d. The following MEFs were derived for the IBC/BAP:

(1) Must be able to cradle the BEB/bay securely for transport or storage.

(2) Must be able to support the BEB/bay until it is launched.

(3) Must be able to accept the BEB/bay for retrieval.

3.3 CLASSIFICATION/CHARGEABILITY GUIDELINES:

a. Outline: The process of scoring test incidents is divided into two parts. The first part is the classification of the test incident based upon the failure definition. Classification is a categorization of the effect of the incident and is made without regard to who or what caused the incident or when it occurred. The classification procedures are covered in steps 1 through 7 of paragraph 3.3.b. The second part of the scoring process is the assignment of chargeability for all test incidents. The chargeability step assigns the primary cause for the occurrence of the incident to one of six operational elements. Once chargeability has been determined, the appropriate agency will be assigned the responsibility for the corrective action. Figure 3-1 contains the classification/ chargeability flow chart. Chargeability is covered in step 8 of paragraph 3.3.c.

c. Classification/Chargeability Flow Chart Expansion (see Figure 3.3):

(1) Step 1 -- No Test

(a) Question: Is the incident a "No Test?"

(b) Procedure: If the answer is "YES", score the incident as "NO TEST", and record the no test category, then stop. If the answer is "NO", proceed directly to step 2.

(c) Expansion: The "No Test" category includes the following:

1. Pretest/Posttest Checkout. Prior to test start any incident that occurs will be scored as No Test. This includes an initial "burn-in" of components, if there is burn-in. All incidents detected after the initial inspection period will be scored on their own merits under succeeding steps. Incipient failures found under final inspection will be scored under their own merits under succeeding steps.

2. Equipment Modification. This includes all maintenance actions involved in the installation of hardware kits

or incorporation of redesigned components. If the replaced component was not functioning at the time of its replacement with the modification, the incident will be scored on its own merit. The maintenance time will be estimated based on the time to restore the system to its operational state. Subsequent malfunctions of the modification will be scored on their own merit.

3. Test Peculiar. Malfunctions caused by nonsystem equipment or people not acting as crew or maintenance personnel are scored as "No Test". Engineering evaluations to analyze the cause of malfunctions as well as any malfunction and/or maintenance efforts caused by the engineering evaluation are scored as "No Test". This also includes maintenance evaluations conducted as part of the test plan and malfunctions to or caused by test peculiar instrumentation. Incidents related to test peculiar diagnostic equipment used in lieu of the diagnostic equipment which will-be fielded are scored on their own merit under succeeding steps. Incidents caused by contractor or other personnel acting as crew or maintenance personnel will be scored on their own merit under succeeding steps.

4. Daily Checks and Services. This consists of preoperation, during operation, and postoperation checks and services performed by the crew as prescribed by the equipment publication, which were completed within 60 minutes per end item 'using the On Equipment Materiel (OEM) tools and repair parts. As daily services are not anticipated, 60 minutes is estimated to be an acceptable, nominal amount of time per end item. If these criteria are not met, the incident will be scored on its own merit under succeeding steps.

5. Deliberate Abuse. This includes willful abuse (e.g. performance capability limit test) whether it was prescribed by the test plan or not. Abuse by operator or maintenance personnel will be scored on its own merit under succeeding steps.

6. Non-RAM Oriented. This step includes those events for which a test incident report might be initiated by the test activity, but which are not used in RAM computations. Examples include suggested improvements, reports of test procedure, unusable or unacceptable replacement parts which were discovered prior to or during installation, consistent inability to meet performance specifications where no malfunction has occurred, and suggested human factors improvements. Recommended changes to the system support package not related to a specific test incident are also covered by this step.

(2) Step 2: Durability Failure:

(a) Question: Was the incident a durability failure?

(b) Procedure: If the answer is "NO," proceed directly to step 3. If the answer is "YES," score as a durability failure and proceed to step 5.

(c) Expansion: A durability failure is defined as a malfunction that precludes further operation of an individual IRB component (i.e. bridge, bay, launch/retrieve mechanism, IBC, or BAP) and is great enough in cost, safety, or time to restore, that the component must be replaced, rebuilt, or overhauled. Such failures are considered durability failures if they occur prior to reaching a predefined level of use. Normally, durability failures are evidenced by replacement or rebuild at GS or Depot levels of maintenance. The onset of a suddenly increasing failure rate indicative of overall component wearout should be considered as well.

The following are the durability criteria for the CBT:

The CBT must be able to execute 1380 launch/retrieve cycles before experiencing a durability failure of the launch/retrieve mechanism.

The IBC must be able to execute 414 launch/retrieve cycles before experiencing a durability failure.

The launch/retrieve cycle breakdown for the CBT is listed in Table 1.

TABLE 1 -- CBT LAUNCH/RETRIEVE BREAKDOWN

Component	No. of Cycles
Interior Bay	690 (50%)
Ramp Bay	276 (20 %)
BEB with IBC	414 (30%)
Total	1380

(3) Step 3: Scheduled Maintenance Action:

(a) Was the incident a scheduled maintenance action?

(b) Procedure: If the answer is "NO," proceed directly to step 4. If the answer is "YES," score as a scheduled maintenance action and proceed to step 8. It is necessary to record one removal for each spare and record the clock minutes, maintenance man-minutes for both on and off-system maintenance by level and MOS and the repair parts used.

(c) Expansion: Scheduled maintenance actions are programmed services and/or replacements performed at intervals. defined by either calendar time or usage in hours. Scheduled maintenance also covers those programmed replacements which are not usage related, but which are dictated by measured wear or deterioration (on-condition maintenance). These actions must be prescribed by the equipment publications and must have sufficient latitude in their time of performance to permit them to be accomplished during a slack period between missions.

(4) Step 4: Crew Correctable Maintenance Action (CCMA):

(a) Question: Was the incident a malfunction which was corrected by the operator using only on-board tools, repair parts and spares, and was it performed within 45 minutes?

(b) Procedure: If the answer is "YES", score as "CCMA" and record one removal for each spare used. Record clock minutes, maintenance man-minutes and repair parts used. If the answer is "NO", proceed to step 5.

(c) Expansion: This step covers those minor maintenance actions which may interrupt the missions, but which the operator can correct by immediate action and continue the mission. Crew action need not be maintenance, but may be simply rerunning the beginning operations procedures. In a test environment, there will usually be test peculiar analysis and diagnostic time associated with the action. Delete test peculiar time before scoring this incident. Allowable time must be consistent with mission requirements. The time limit is the maximum downtime which would not result in a serious impact on the effectiveness of the system. A spare is defined as those support items that are coded as repairable . A repair part is defined as those support items that are coded. as not repairable.

(5) Step 5. Operational Mission Failure (OMF).

(a) Question: Was the incident an actual, intermittent or incipient malfunction which caused or could have caused either:

1. The inability to perform one or more of the mission essential functions to a degree specified in paragraph 3.2?

2. A critical or catastrophic hazard to personnel or equipment as defined in MIL-STD-882B. 30 Mar 84 (reference paragraph 3.4)?

(b) Procedure: If the answer is "YES", score as "OMF". If a maintenance action is performed record an Essential Maintenance Action "EMA" and Unscheduled Maintenance Action

"UMA". Record one removal for each spare used. Record the clock-minutes, maintenance man-minutes for both on- and off- system maintenance by level and military occupational specialty (MOS) and repair part used, then proceed to step 8. If the answer is "NO", proceed directly to step 6.

(c) Expansion: A malfunction caused by another simultaneous malfunction is scored as one failure. The maintenance time will be sum of the maintenance time for both incidents. An incipient malfunction whose repair is deferred to a scheduled maintenance period will be scored on its own merits under succeeding steps. If a system has two items which are redundant at all times, an OMF is not scored unless both items are down at the same time. If a backup system is not redundant at all times, a failure of the primary item will be scored as an OMF regardless of the status of the backup system at the time of the incident.

(6) Step 6 Essential Maintenance Action (EMA)

(a) Question: Was the incident an unscheduled maintenance action which required corrective action prior to starting the next mission?

(b) Procedure: If the answer is NO, proceed directly to step 7, if the answer is yes, classify as "EMA" and 'Unscheduled Maintenance Action "UMA" and record one removal for each spare used. Record the clock minutes, maintenance man-minutes for both on and off-system maintenance by level and MOS, and the repair parts used.

(c) Expansion: Essential maintenance actions include all operational mission failures plus any additional unscheduled actions which require corrective action prior to starting the next mission (e.g., repair of a redundant mission essential component).

(7) Step 7: Unscheduled Maintenance Action (UMA).

The incident was an unscheduled maintenance action. Record one removal for each spare used and record the clock minutes, maintenance man-minutes for both on and off-system maintenance by level and MOS, and the repair parts used.

(8) Step 8: Identification of Chargeable Elements.

(a) Question's: What operational element was primarily responsible for the incident?

(b) Procedure: Assign the test incident to one of the following categories:

1. Chargeable to hardware (CH). This includes personnel related incidents that are attributable to characteristics of the hardware design.

a. Chargeable to Transporter (CT)

b. Chargeable to Boat (CB)

c. Chargeable to Launch/Retrieve Mechanism (CL)

d. Chargeable to Interior Bay (CI)

e. Chargeable to Ramp Bay (CR)

f. Chargeable to Improved Boat Cradle (CBC)

g. Chargeable to Bridge Adapter Pallet (CEP)

2. Chargeable to crew (CC).

3. Chargeable to maintenance personnel (CMP).

4. Chargeable to manuals (CM).

5. Chargeable to support equipment (CSE). `This support equipment includes special and common tools, spares, repair parts, associated software, etc..

6. Chargeable to accident (CA). This includes only accidents which cannot be charged to one of the above elements; e.g., an accident caused by a crew error, would be charged as CC.

c. Expansion: This step assigns chargeability to all incidents except the no test and scheduled maintenance incidents. Actual maintenance need not be performed in order to assign chargeability.

3.4 Extract of MIL-STD-882B. MIL-STD-882B, Requirements for System Safety Program for Systems and Associated Subsystems and Equipment, dated 30 March 1984, provides uniform requirements and criteria for establishing and implementing system safety programs. Under section IV, the work hazard severity is defined as follows:

> Hazard severity categories are defined to provide a qualitative measure of the worst credible mishap resulting from personnel error, environmental conditions, design inadequacies, procedure deficiencies; or system, subsystem on component failure or malfunction as follows:

APPENDIX E

Description	Category	Mishap Definition
CATASTROPHIC	I	Death or system loss
CRITICAL	II	Severe injury, severe occupational illness, major system damage.
MARGINAL	III	Minor injury, minor occupational illness, or minor system damage.
NEGLIGIBLE	IV	Less than minor injury, occupational, illness, or system damage.

APPENDIX F

VEHICLE NOMENCLATURE

PREVIOUS VEHICLE DESCRIPTIONS						ATPD 2304 VEHICLE DESCRIPTIONS		
Chassis Type	Body	Type	Model	Nomenclature	NSN	Nomenclature	Additional Kit	Mission
I	A	Cargo	M977	Truck, Cargo, With Winch	2320-01-097-0260	Light Cargo	Winch	IA
				Truck, Cargo, Without Winch	2320-01-099-6426	Light Cargo		IA
I	B	Tanker	M978	Truck, Tank, Fuel, With Winch	2320-01-097-0249	Tanker	Winch	II
				Truck, Tank, Fuel, Without Winch	2320-01-100-7672	Tanker		II
II	E	Tractor	M983	Truck, Tractor, With Winch, Without Crane	2320-01-097-0247	Tractor	Winch	IV
			M983	Truck, Tractor, With Winch, With Crane	2320-01-099-6421	Not Applicable	Not Applicable	Not Applicable
III	D	Cargo	M985	Truck, Cargo, With Winch	2320-01-097-0261	Heavy Cargo	Winch	IB1
			M985	Truck, Cargo, Without Winch	2320-01-100-7673	Heavy Cargo		IB1
			M985E1	Truck, Cargo, With Winch	2320-01-194-7032	Heavy Cargo Guided Missile Transporter	Winch	IB2
IV	C	Recovery	M984A1	Truck, Wrecker-Recovery	2320-01-195-7641	Wrecker		III
			M984	Truck, Wrecker-Recovery	2320-01-097-0248	Not Applicable	Not Applicable	Not Applicable
			M1120	HEMTT-LHS With Winch	2320-01-471-2731	LHS-Light	Winch	VA1
				HEMTT-LHS Without Winch	2320-01-471-1326	LHS-Light		VA1
			M1977	Common Bridge Transporter (CBT) With Winch	2320-01-443-8023	Common Bridge Transporter (CBT)	Winch	VC
			M1977	Common Bridge Transporter (CBT) Without Winch	2320-01-443-1940	Common Bridge Transporter (CBT)		VC
			M1074	Truck, Palletized Loading , With MHC	2320-01-304-2277	LHS-Heavy With MHC		VB2
			M1075	Truck, Palletized Loading , Without MHC	2320-01-304-2278	LHS-Heavy Without MHC		VB1
			M1076	Trailer, Palletized Load System (PLST)	2330-01-303-5197	LHS Trailer (LHST)		VI
						M1120 Bare - LHS-Light Bare (Without LHS/Winch)		VA0
						M1075 Bare - LHS-Heavy (Without LHS/MHC/Winch/Auxiliary Fuel Tank)		VB0